

Gemini Cad Systems
www.geminiCAD.com



Gemini Photo Digitizer

User manual *rev VX9*



Gemini Photo Digitizer

is part of the Gemini CAD package,
that contains the following applications:

Gemini Pattern Editor
Gemini Photo Digitizer
Gemini Cut Plan
Gemini Nest Expert
Gemini PLT Spooler

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Gemini Photo Digitizer

1. Gemini Photo Digitizer: what it IS and what it DOES

« Gemini Photo Digitizer» application is a tool that helps you to convert the printed or paper patterns into an electronic form. For this you will need a photo camera and a contrast surface.

The camera is connected to a computer where Gemini Photo Digitizer is installed. After you capture the picture the application converts image in geometrical shapes, and technical elements.

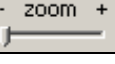
1.1 The main advantages of digitizing using a Camera

There are **three main advantages** resulting from digitizing with a camera

- The pattern can be converted very quickly in electronic format because the user will just take a picture and he will no longer cover all pieces shapes and technical elements. The conversion will be make automatically by Gemini Photo Digitizer. For example: it will takes at list 30 minutes to use a digitizer for a model with 7 pieces and only few seconds to digitize with a camera or scanner.
- If you will use a camera than you will earn the entire space necessary for a classic digitizer
- The geometrical shapes of the patterns can be saved in many file formats: as *.GEM, DXF, TMP, Assyst ZIP, EXP, IBA. Because of this, the digitized patterns can be loaded in very different CAD systems.

1.2 Gemini Photo Digitizer - Functions list

Load picture	
Capture picture	
Scan picture	
Detect piece contour	
Save (Export to Assyst (.ZIP), Export to Dxf (.DXF), Export to FK, Export to Gerber (.TMP), Export to Investronica (.EXP), Export to Lectra (.IBA), Export to Investronica database)	
Undo – cancel last change	
Redo – remake last change	
Zoom to the selected area	
Zoom to selected pieces	
Zoom to all pieces	
Transform line to curve	
Transform curve to line	
Create notch	

Delete notch	
Detect internal point	
Create internal point	
Delete internal point	
Detect internal line	
Create internal line	
Delete internal line	
Add auxiliary pattern	
Remove auxiliary pattern	
Show / hide grid	
Measure on perimeter	
Measure distance between two points	
Show / hide notches	
Show measurements on contour	
Show / hide internal lines	
Show / hide internal points	
Play piece contour	
Play grade points	
Play notches	
Play internal points	
Play internal lines	
Zoom in / Zoom out	

1.3 The workspace – what you need to know before starting to digitize with a camera

A. Definitions and explanations

To understand and master the Gemini Photo Digitizer functions we must clearly define and explain the technical terms.

Picture

A picture represents photography of some patterns made with a camera or a scanner.

Picture resolution

Resolution refers to the number of pixels in an image. Resolution is sometimes identified by the width and height of the image as well as the total number of pixels in the image. For example, an image that is 2048 pixels wide and 1536 pixels high (2048X1536) contains (multiply) 3,145,728 pixels (or 3.1 Megapixels). You could call it a 2048X1536 or a 3.1 Megapixel image. As the megapixels in the pickup device in your camera increase so does the possible maximum size image you can produce. This means that a 5 megapixel camera is capable of capturing a larger image than a 3 megapixel camera.

Sensor Size

Sensor size determines how much noise a sensor produces, and noise is one of the main limitations on the performance of a digital camera. Noise in a digital image is manifested as speckles all over.

It is recommended to use camera with Sensor Size" between 1 / 2.5" and 1 / 1.6".

Camera Exposure

Exposure is the amount of light which falls upon the sensor of a digital camera. Shutter speed and aperture are adjusted to achieve optimal exposure of a scene. Most digital cameras offer a variety of exposure modes from fully-automatic to semi-automatic to full manual mode.

Camera ISO

ISO is the number indicating a digital camera sensors sensitivity to light. The higher the sensitivity, the less light is needed to make an exposure. Shooting at a lower ISO number requires more light than shooting at a higher number. Lower numbers result in images with the least visible noise, which is desirable.

Camera flash

Many digital cameras have several flash modes to choose from. A built-in flash is small and not very powerful so whichever mode you use, make sure to stay within the specified flash range.

Camera zoom

A digital camera, usually, can make two types of zoom: Optical zoom and Digital zoom.

Optical zoom

Optical zoom magnifies the size of an image by adjusting the lens. Unlike digital zoom, optical zoom enlarges the subject without sacrificing resolution.

All cameras have something called a focal length. This is true even for a camera without a zoom lens. The focal length is the distance from the optical center of the lens to the camera's focal point. For digital cameras the focal point is located on the camera's sensor. The position of the lens changes as you zoom in and out. As you zoom in the focal length increases. As you zoom out the focal length decreases.

Digital zoom

Digital zoom is completely different to optical zoom. Rather than using the lens to zoom, digital zoom is carried out by software inside the camera. Concisely the software enlarges part of the image to give the impression of zooming in. An element of guesswork is involved in the process and leads to a decrease in quality. Therefore optical zoom is considered far superior to digital zoom.

It is not recommended to use digital zoom when you capture pictures for digitizing.

Piece

A piece is a detected contour with a specific shape and technical elements as: notches, grain axis, text axes, internal points, piece name. The piece contour is formed by points with specific coordinates; the points are connected by lines and curves.

Points

Multiple points connected by lines and/or curves form a piece contour. The points can be corners or can be located on curves and lines. Each point has two coordinates, on horizontal and on vertical from the piece origin point. Piece origin can be any point on the contour and can be reallocated without any contour shape changes.

To modify a piece shape you can change the point type and position, you can add or delete points or you can change the curve shapes. There are two types of points: graded points and curve points.

Corners

The points from piece contour can be cusp or can be smooth.

On the smooth point, there is a single tangent. This tangent has two control points whose movements are symmetrical. For a cusp point, the control tangents are mutually independent as angle or length.

The user can set the type of point that will correspond to a corner, a grade point or a curve point.

All the time a corner point will be a cusp point. Even if the user set the corners as curve points, this points will not be interpolated and will remain cusp.

Bezier curve; Control points; End points

Lines and curves connect the contour points. Gemini Photo Digitizer uses a special curve type named « Bezier curve » from the French mathematician that invented them. A Bezier curve is a curve between two points whose shape can be adjusted by moving two control points.

Bezier curves may reproduce accurately the natural and anatomical shapes, being very useful for pattern contours tracing. All you need to know about Bezier curves is that they are defined by 4 points: 2 end points and 2 control points; moving these points are modifying the curve shape.

B. What you need to know before starting to take photos

Choosing the photo camera

It is recommended to use a camera with a big Sensor Resolution (between 6 and 10 Mega Pixels).

For 6 MP, using an aspect ratio of 4:3 (2832 X 2128 pixels), on a photo area of 1metter per 0.75 meters, 1 pixel will represent 0.35mm

For 6 MP, using an aspect ratio of 3:2 (3000 X 2000 pixels), on a photo area of 1metter per 0.67 meters, 1 pixel will represent 0.33mm

In addition, if it will be used a camera with a bigger sensor resolution, the conversion of picture will be done with more accuracy because 1 pixel will represent a smaller surface.

The minimal recommended picture resolution is that one where 1 pixel don't has more than 0.4mm. In this case, a camera of 10 MP it is recommended to take photo to a surface of maximum 1, 4 meters x 1 meter.

It is recommended to use camera with Sensor Size" between 1 / 2.5" and 1 / 1.6".

To connect faster to the camera you can remove the memory card.

The Gemini Photo Digitizer supported cameras are Canon cameras listed bellow:

PowerShot A10,
PowerShot A20,
PowerShot A30,
PowerShot A40,
PowerShot A60,
PowerShot A70,
PowerShot A75,
PowerShot A80,
PowerShot A85,
PowerShot A95
PowerShot A100,
PowerShot A200,
PowerShot A300,
PowerShot A310,
PowerShot A400,
PowerShot A510,
PowerShot A520,
PowerShot A620
PowerShot A640

PowerShot S1 IS,
PowerShot S2 IS
PowerShot S3 IS
PowerShot S5 IS
PowerShot S10,
PowerShot S20,
PowerShot S30,
PowerShot S40,
PowerShot S45,
PowerShot S50,
PowerShot S60,

PowerShot S70
PowerShot S80,

PowerShot G1,
PowerShot G2,
PowerShot G3,
PowerShot G5,
PowerShot G6,
PowerShot G7
PowerShot G9
PowerShot G10
PowerShot Pro90 IS,
PowerShot Pro1

PowerShot S100, IXY DIGITAL, DIGITAL IXUS,
PowerShot S110, IXY DIGITAL 200, DIGITAL IXUS v,
PowerShot S200, IXY DIGITAL 200a, DIGITAL IXUS v2,
PowerShot S230, IXY DIGITAL 320, DIGITAL IXUS v3,
PowerShot S300, IXY DIGITAL 300, DIGITAL IXUS 300,
PowerShot S400, IXY DIGITAL 400, DIGITAL IXUS 400,
PowerShot S410, IXY DIGITAL 450, DIGITAL IXUS 430,
PowerShot S500, IXY DIGITAL 500, DIGITAL IXUS 500,
PowerShot SD100, IXY DIGITAL 30, DIGITAL IXUS II,
PowerShot SD110, IXY DIGITAL 30a, DIGITAL IXUS IIs,
PowerShot SX100 IS
PowerShot SX110 IS

EOS-1D Mark II
EOS 20D
EOS-1Ds Mark II
EOS Kiss Digital N/350D/REBEL XT
EOS 5D (EOS 5D cannot be used with Mac OS X 10.5.)
EOS-1D Mark II N
EOS 30D
EOS Kiss Digital X/400D/REBEL XT
EOS-1D Mark III
EOS 40D
EOS-1Ds Mark III
EOS DIGITAL REBEL Xsi/450D/ Kiss X2
EOS DIGITAL REBEL XS/ 1000D/ KISS F
EOS 50D
EOS 5D Mark II
EOS Kiss X3/EOS REBEL T1i /EOS 500D

The Gemini Photo Digitizer supported cameras are Nikon cameras listed bellow:

Nikon Coolpix L19
Nikon Coolpix L20
Nikon Coolpix L21
Nikon Coolpix L22
Nikon Coolpix S220
Nikon Coolpix L100
Nikon Coolpix S570

The supported cameras list will be bigger and you can download it from our site.

You can use a camera, which is not in the supported cameras list, but this one has to have the recommended characteristics. In this case, the user will take photos on camera memory, will download them on PC and will load the pictures on Gemini Photo Digitizer. This will require more time than using a supported camera.

Camera position:

Camera must be placed on a fixed position (use a tripod or any other type of support that will keep the camera fixed)

It is recommended to fix the camera on room ceiling, above the digitizing surface. But you must carry on the conditions: keep minimum distance, use only optical zoom, and capture the entire digitizing surface).



Advantages for fixing camera on a room ceiling support:

- The camera will not take space on the room and you can use the work table
- This camera position will not allow the accidental moves of it
- The piece arrangement will be done much easy if the pieces will be placed in horizontal plane.

Camera must be placed as perpendicular as possible on digitizing area.

The camera must be placed at a minimal distance that allow the camera to capture the entire digitizing surface

This distance depends on the camera optical system and the zoom level. The usual distance is about 1.5 - 2.0 m for a digitizing surface of 120 x 90 cm. The distance and the zoom level of the camera must be adjusted to best fit the digitizing surface in the captured image

Camera zoom and distance must be set to photo only the digitizing area

It is recommended to use a power supply for the camera.

The connection cable between camera and computer must have the minimum length and is recommended to be from one single piece. For every lengthener cable added, the data transmission becomes more unreliable.

Base rule: Do not move the camera if you don't want to recalibrate!

Digitizing surface:

To obtain correct picture the digitizing background color must be in contrast with the pieces color. If you have cardboard pieces, it is recommended to use a white background. If the pieces are from white paper, it is recommended to use a dark background (black, dark green or any other contrast color).

It is not recommended to use black background if you want to digitize printed patterns. This is not recommended because when the printed patterns are cut it is possible to remain the black contour and this can affect the precision on detection.

You can use fabric for background. The fabric must be lay perfectly and must not be crumpled.

The surface used for photo digitizing must be opaque to do not reflect the light.

The digitizing surface must be very clean, not written or scratched

The color of the digitizing surface must be uniform.

The digitizing surface must be correlated with:

- wanted precision and camera resolution
- camera must capture only the digitizing area

Pieces:

On the digitizing surface can be placed many pieces. There is no limit for piece number.

Rules that must be followed:

Pieces must be placed on active area of digitizing (active area is the zone detected on calibration). If it is possible the pieces must be arranged in the middle area of digitizing surface.

The distance between pieces must be at least 3 cm (recommended 5 cm).

Do not use adhesive tape on margins to fix pieces.

Be sure that the pieces are perfectly stretched and the corners are not folded.

Be sure that the pieces edges are completely laid on the digitizing surface, otherwise you might have shadows around the piece and the conversion will not be properly done.

The pieces must be properly cut (the piece contour must be smooth)

Recommendation:

It is recommended to use a camera fixed on the ceiling. In this case the pieces will be placed in horizontal plane. This type of placing is very helpful because you don't need to stick the pieces on the digitizing surface you just have to place the pieces according the rules enounced before.

If the pieces are wrinkled, you can use a transparent and non-reflective glass or Plexiglas. The glass or the Plexiglas will be placed over the patterns. The Plexiglas surface will laid and fixed the patterns. If you are using glass is not recommended to use the flash when you are taking pictures.

If you don't use this type of glass or Plexiglas you must use heavy weights to fix the pieces. The recommended weights must be small and should be placed on at list 2 cm from the edge of the pattern.

Do not use big and height objects to fix the patterns. You must be careful to the weights dimensions in order to avoid shadows.

For bigger accuracy on internal elements detection you must avoid to draw elements near the patterns edges and the text must be as short and as small as possible. Use patterns with fewer texts. Use pen less visible for the texts, for the internal drawings and the seam line.

The texts must be as small as possible and must be at list at 1 cm distance from the internal lines.

For internal lines and internal points use black or blue pen for cardboard or white paper patterns. If the patterns are from a different color than white than use a contrast color to mark the internal lines and points.

You must avoid drawing internal lines till the pattern edges. The longer internal line will be detected as grain axes. It is recommended to draw the internal line as it is possible in the middle of the pattern. If you will mark one end of the grain axes with a spot, that end will be interpreted on conversion as the direction of the grain axes.

How must be the internal points to be precise detected:

- Two intersected lines of 1 or 1.5 cm length
- the lines must be perpendicular on each other
- the lines must be intersected in the middle

How should appear the notches to be precise detected:

- One small line not to bolded
- must have at list 0.5 or 1.5 cm in length
- must be drawn at the correct angle

Luminosity

- For a good picture is recommended to use natural light
- While using artificial light please ensure that the digitizing area is uniform lighted
- When using other source than natural light be sure that the picture will not be too bright or too dark
- If the intensity of light suffered substantial modifications, it is necessary to set again the camera exposure. It is not necessary to recalibrate.

Calibration

Calibration is the process of determining the relation between the picture and a standard measurement. It is necessary the calibration because of the lens distortions. The most frequent distortion is barrel effect.

Barrel distortion is a lens effect, which causes images to be spherical or "inflated".

To calibrate it is necessary a grid or you can introduce a horizontally and vertically dimension for the picture.

For a precise calibration, it is recommended to use a printed grid.

So it is very important to not change the camera position after calibration because if you will change it you will have different dimensions for pieces.

Grid paper properties:

The grid must be printed on a white paper (as white as possible). The paper must have uniform color, without any type of drawings and without folds. It is recommended to use matt paper to not reflect the light.

The paper must have the length and the width bigger with 20% than estimated digitizing area.

How to print the grid:

The grid must be printed on high quality printer. It is recommended to use inkjet plotter not plotter with pen.

Use black color for grid, and ensure that the grid is not interrupted. The grid lines must be at list 2 mm width.

The grid must have equal rectangles (recommended squares of 5 cm). It is not essential to have squares of 5 cm; the main condition is to have perfect equal rectangles from begin to the end of the grid on width and on height also.

It is important to have the same width and the same height for all rectangles on grid. If it is possible is recommended to use squares on grid or to have a very small difference between the width and the height of the rectangle.

Is not necessary to have exact dimensions for width or for height of a rectangle, you can use decimal values like 5.2cm but only if the grid is according to mentioned rules.

The grid must be bigger than photo area (at list 10 % bigger)

Note You will find in the installation folder a directory which contains a PLT file with the grid (grid_5_cm.PLT). You can print this file to obtain a grid with 5 cm squares.

How to check the grid:

Because on plotting can appear dimensions deviations it is necessary to measure again the grid.

After printing, verify that

- opposite sides are *identical* as size (max. tolerance is 0.5 mm for entire length).
- diagonals are identical as size (max. tolerance is 0.5 mm for entire length).

To obtain a correct measurement you must place the tape-measure exactly in the middle of the grid line.

The square dimension can be calculated also by dividing the measured distance with the number of squares (using this method many measuring errors will be avoided). If the length and width dimension are different than you must print again the grid, (the max deviation allowed is 0.1%).

How to place the grid:

Be sure that the paper with the grid is perfectly stretched and there are no folds and shadows on it.
Place the grid to appear aligned in picture (as horizontally as possible).

Calibration checking:

It must be checked if all lines intersections were correct detected (the maximum deviation allowed is 1 pixel). The detected intersections are marked with red crosses. It is possible to do not detect all intersection for extreme lines or columns, but this can be accepted with the condition to have enough space for digitizing.

You must check ALL detected intersections not only some of them!!!!!!

The calibration procedure is detailed on Chapter 3.

C. What you need to know before starting to use Gemini Photo Digitizer

Besides taking pictures, you will need basic knowledge on computer work: open and save the projects, undo operation mistakes, display the pieces in a project.

Zoom level

In order to perform various operations you may need a general project overview or you may need a higher detail on a smaller piece. For this operation you can use the magnifiers in the standard toolbar, or the shortcuts.

Zoom out means drawing reducing, while **zoom in** means drawing enlargement.

Zoom buttons have the following facilities:

-  you can drag the interactive cursor toward « + », to **zoom in** or toward « - » to **zoom out**
-  zoom to selected area (click on this button and then click on the left mouse button and drag to define the region of interest)
-  zoom to selected piece (the image magnified for a selected object to fill the workspace)
-  zoom the whole project (zoom to all detected pieces)

Useful zoom shortcuts are

- **F2** – Zoom in
- **F3** – Zoom out (shrink the image)
- **F4** – Zoom to selected piece
- **F5** – Zoom to the whole model
- **Mouse wheel** – Zoom to the region where the mouse cursor is located. The zoom can go in or out according to the mouse wheel direction rotation.

Save and restore zoom level

The user has the possibility to save the zoom level and to restore it. For example this is very helpful when you are in Play mode and you can not use any button from button bar.

To save the zoom level you must press **Ctrl+F7** keys.

To restore the zoom level you must press **F7** key.

Zoom magnifier

On main window of Gemini Photo Digitizer, there is a "magnifier" which allows to have a view on a bigger scale the indicated area from picture. The zoom level from magnifier can be adjusted by user using the "+" or "-" buttons. The zoom level can be modified also from "General Settings" window.

You can navigate in the view area by using **SPACE** key. When you will press **SPACE** key, the mouse cursor will become a hand. Keep pressed this key to drag the image.

If you will keep press **ALT** key the mouse will move slowly on the image / conversion area.

2. Camera settings

If it is used one of the supported camera, user can capture pictures directly from Gemini Photo Digitizer application.

If it is used a different camera than it is mentioned in our compatible cameras list, the user will take photos on camera memory, will download them on PC and will load the pictures in Gemini Photo Digitizer.

Camera position:

Camera must be placed on a fixed position (it is recommended to fix the camera on room ceiling).

Camera must be placed as perpendicular as possible on digitizing area.

Camera must be placed at a distance of minimum 2 meters and maximum 5 m.

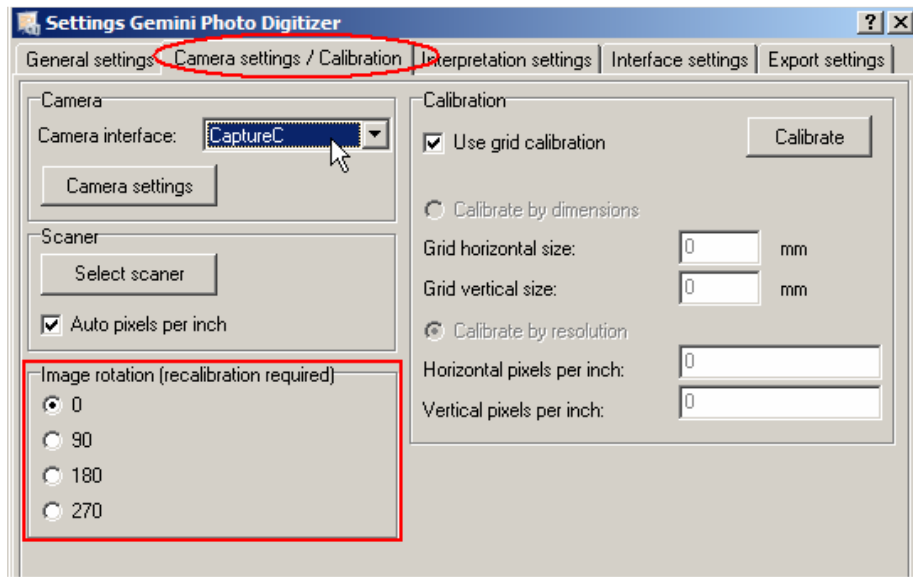
Camera zoom and distance must be set to photo only the digitizing area

Base rule: Do not move the camera if you don't want to recalibrate!

You can set the picture position from Gemini Photo Digitizer settings.

It can be set to 0, 90, 180 and 270 degrees in "Camera settings/ Calibration" tab.

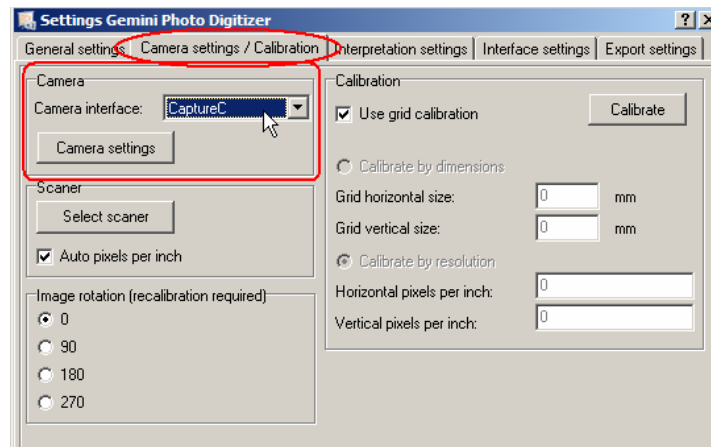
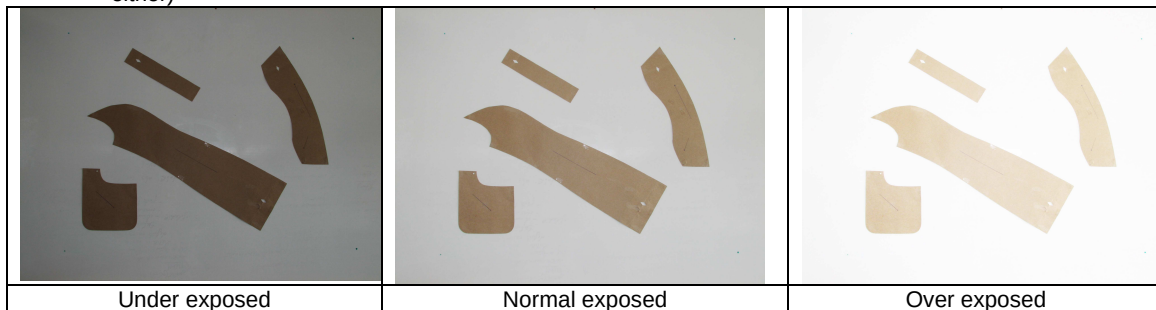
This setting will rotate the image (in preview and in captured picture) according to the checked angle. By default the camera position will be 0. If you change the camera position you must recalibrate.



Recommended settings for camera:

To obtain a correct picture for Gemini Photo Digitizer the camera must be set on:

- maximum resolution
- flash off
- minimum value for ISO
- no digital zoom (only optical zoom for setting the position)
- Exposure must be set according luminosity (resulted picture must be not too bright but not too dark either)



"Camera settings button".

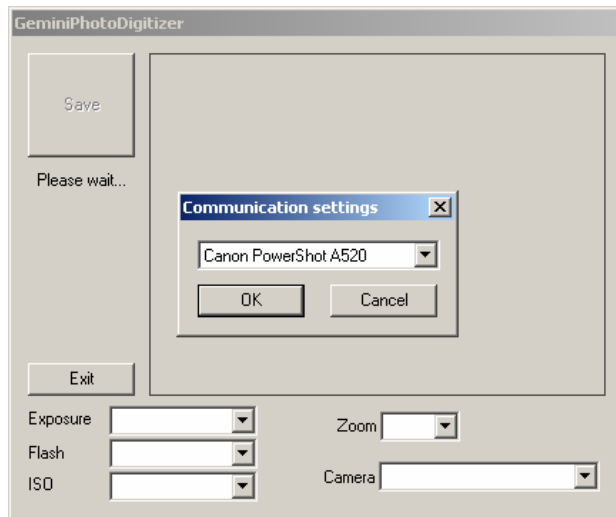
All this settings can be done directly on camera.

For supported cameras, the settings can be established on "Camera settings" window from Gemini Photo Digitizer application.

To set the camera from Gemini Photo Digitizer the user must click on Settings menu. In "Settings Gemini Photo Digitizer" window will select the "Camera settings / Calibration" tab.

According to Camera type in use (Nikon or Canon) must be selected the Capture application. For Canon cameras user must select "CaptureC". For Nikon cameras user must select "CaptureW"

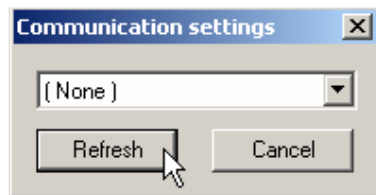
In this tab, the user must press



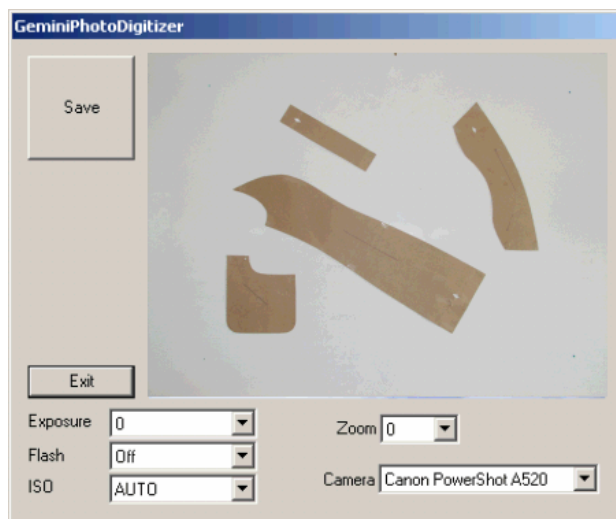
On "Communication settings" must appear the name of used camera.

If you have many cameras connected to the computer, all of them must appear in this list and you have to choose the used camera.

Attention! The selected camera will receive the settings from last used camera. If this camera has different characteristics than the last used camera you must check again, modify and save the camera settings.



If in "Communication settings" did not appear the camera name and you checked to have camera turned ON and connected, than you must press "Refresh" button.



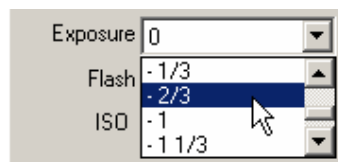
After you select the camera, the settings window will appear. Here you have a preview of digitizing zone.

The preview image will help you to set all camera parameters to obtain a good picture.

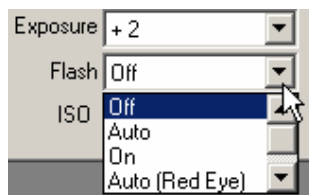
Here you can change the exposure, the flash, ISO and the zoom level.

After you done all settings, you must save them. For this, you must press "Save" button.

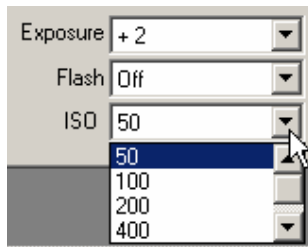
To connect faster to the camera you can remove the memory card.



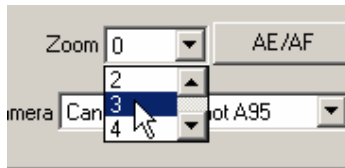
Exposure must be set according to luminosity (resulted picture must be not too bright but not too dark either). If you are changing the exposure, it is not necessary to recalibrate.



It is recommended to take picture with the flash set on OFF.



ISO (equivalent) speed on a digital camera gives an indication of the sensitivity of the image sensor. The best image quality is usually obtained at the lowest ISO setting on your digital camera.



Usually here will appear only optical zoom. For SLR cameras will appear also the digital zoom.

It is recommended to use only optical zoom for setting the position (no digital zoom).

- IMPORTANT:** Before use camera,
- turn on the camera from the « ON / OFF » button
 - ensure that the camera is on view mode
 - check the connection with the computer
 - check the batteries level (if you use batteries)

The user can save different profiles for Gemini Photo Digitizer. A profile contains all information regarding camera settings, and application settings (including calibration).

3. Calibration

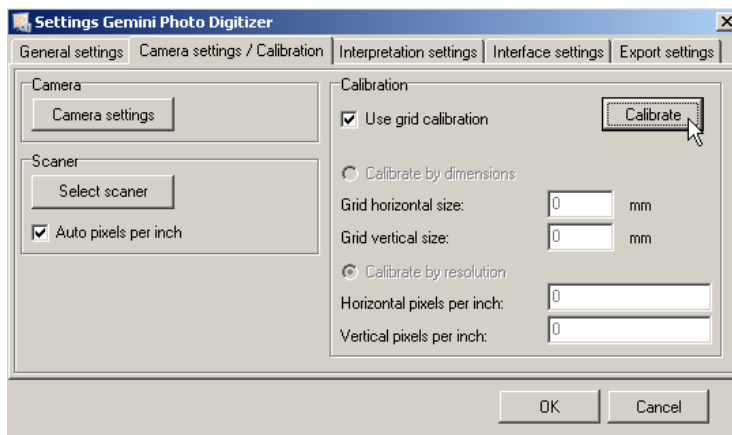
3.1. Camera calibration

At the first use of Gemini Photo Digitizer, it is necessary to calibrate the camera. This operation must be done every time the user will change the position or any settings for camera.

To calibrate a camera it is necessary a grid or you can introduce a horizontally and vertically dimension for the picture. For a precise calibration, it is recommended to use a printed grid.

Camera calibration with grid

For best calibration you must follow all instructions regarding grid paper properties, how must be print the grid, how you must place the grid and how you must check the grid (see chapter 1.3 A)



To make the camera calibration by using a grid you must click on Settings menu and you have to select the "Camera settings / Calibration" tab. Here you will make click on "Calibration" button.

This button is enable only if the message "Use grid calibration" is checked.

Steps for calibration:

- Capture or load the grid picture
- Edit the calibration parameters (introduce the cell width and cell height in calibration window)
- Crop the image if necessary
- Check the calibration result and adjust if necessary

A. Capture or load the grid picture

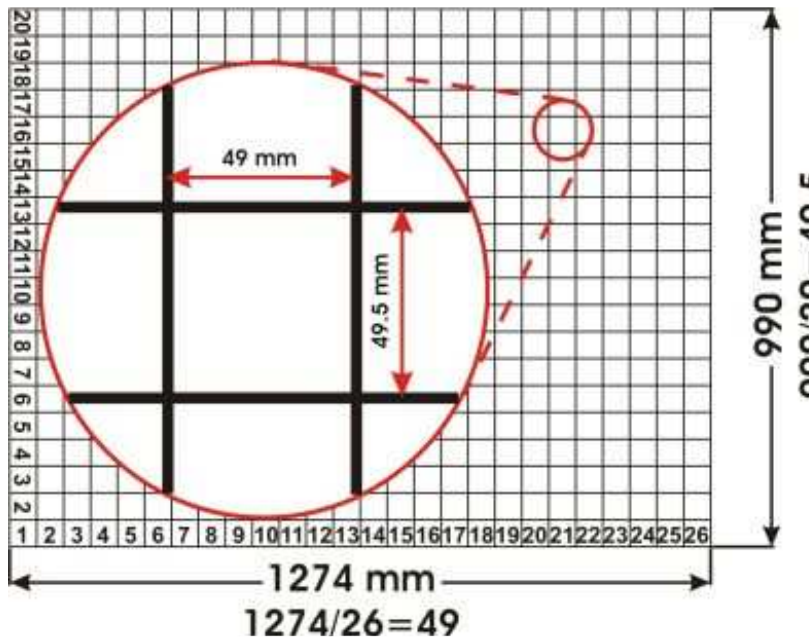
For supported cameras, you can capture the calibration picture directly on Gemini Photo Digitizer.

If you don't use a supported camera you will load the picture from disk using "Load picture" option.



B. Edit the calibration parameters (edit in the cell width and cell height in the calibration window)

In order to calibrate you must introduce the exact rectangle dimensions of the grid (cell width and cell height), and you must select the active area from the grid.



In order to find the real dimensions of the cell from the grid on length you must measure the total length of printed grid and divide it at number of cells that you have on length. You must do exactly in same way to find the real dimensions of the cell from the grid on height: you must measure the total height of the printed grid and divide it at the number of cells from the grid height.

For example, if the grid length is 1274mm and on length you have 26 cells, the real width of your cell will be:

$$\text{cell width} = \frac{1274\text{mm}}{26\text{cells}} = 49.0\text{mm}.$$

If the grid height is 990mm and you numbered 20 cells

than the real height will be:

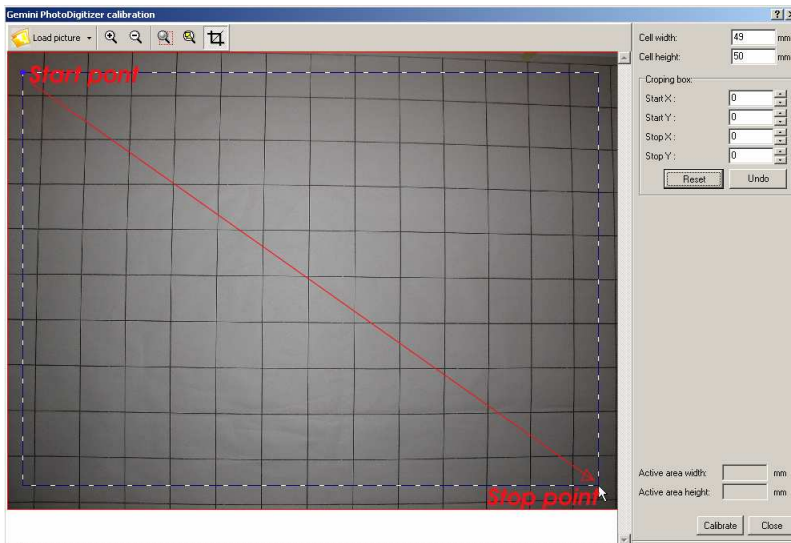
$$\text{cell height} = \frac{990\text{mm}}{20\text{cells}} = 49.5\text{mm}.$$

C. How to use crop function



If your grid picture has incomplete or are not so clear extreme lines it is recommended to select only a part of grid to be used for calibration. For this you must use "Crop" function.

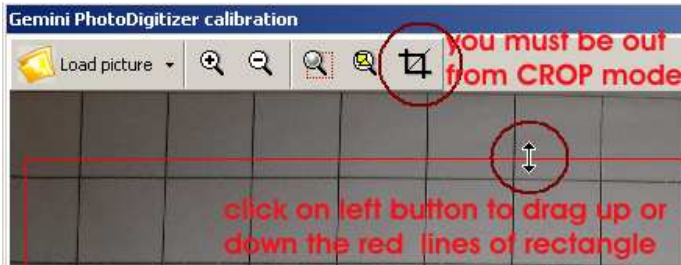
To crop you must make click on CROP button from top of calibration window. By default the crop rectangle is red and has maximum dimension (is as big as the image that you captured for calibration).



After you pressed crop button you must click inside grid picture where you want to start the crop rectangle. Keep left mouse pressed, drag and drop in the opposite corner of crop rectangle. The coordinates for starting and ending points of crop rectangle are displayed in right panel on "Cropping box"

after you released the mouse button.

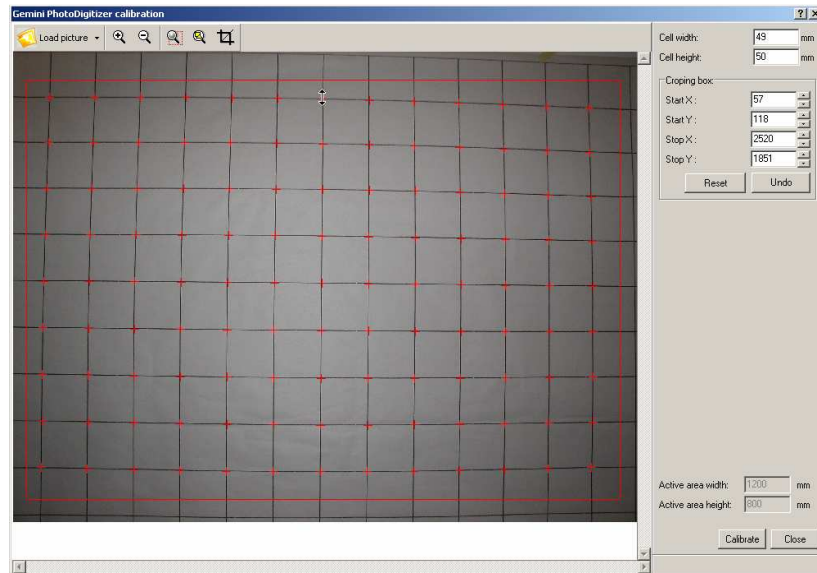
To modify the crop rectangle you can change lines position directly on grid image or you can modify points coordinates in right panel on "Cropping box"



To modify crop rectangle directly on grid image you must assure first that you are not in Crop mode (Crop button is not pressed). Just put the cursor mouse over a side of crop rectangle. The cursor mouse will change into a double arrow and you can click on left mouse button and drag free to a new position. You can use this method to change position for each side of crop rectangle.

After introducing the cell dimensions and selected the active area, you must press "Calibrate" button. The calibration is finished when red crosses appear on grid intersection. The red crosses always appear in the cropped area. This area is the active zone for digitizing.

In the right corner of calibration window, you will find the dimensions of the active area.



D. How to check the calibration and how to adjust it

It must be checked if all lines intersections were correct detected (the maximum deviation allowed is 1 pixel). The detected intersections are marked with red crosses. It is possible to not detect all intersection for extreme square lines or columns, but this can be accepted with the condition to have enough space for digitizing.

Attention! You must check ALL detected intersections not only some of them !!!!!

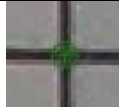
To check each detected intersection you can use zoom buttons from top of the window and **TAB** key or **SHIFT+TAB** key.

Using **TAB** key you will jump to the next cross which will be automatically selected. While using **TAB** key the zoom level will remain the last used.

If you press **SHIFT+TAB** you will jump to the previous cross. This cross will be automatically selected.

How to adjust calibration

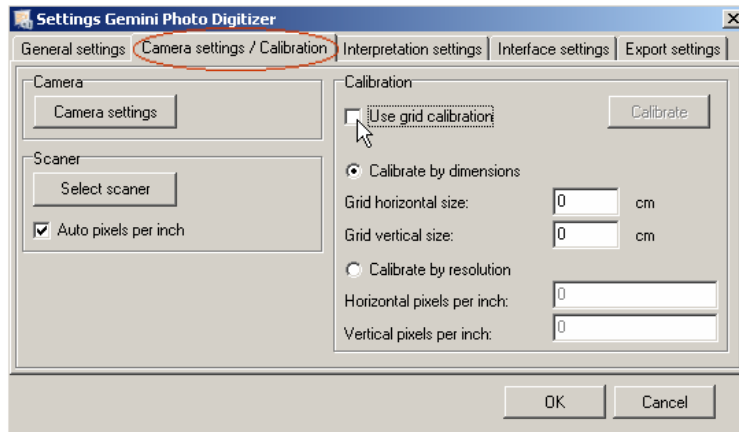
You can select each detected cross and you can adjust its position using keyboard arrows.

		
Calibration cross	Cross representation when cursor is over it	Selected cross

To select a cross you must click on it. When the cursor is placed over a calibration cross, the cross will be displayed bigger with a red circle around. After you click on it (select it) the red symbol will become green. When you will press on the keyboard arrows the selected cross will be move with 0.5 pixels at each key press.

After you ensured that the calibration was done properly, you have to click "Close" button from calibration window. On "Settings Gemini Photo Digitizer", you must click on "OK" button to keep the calibration.

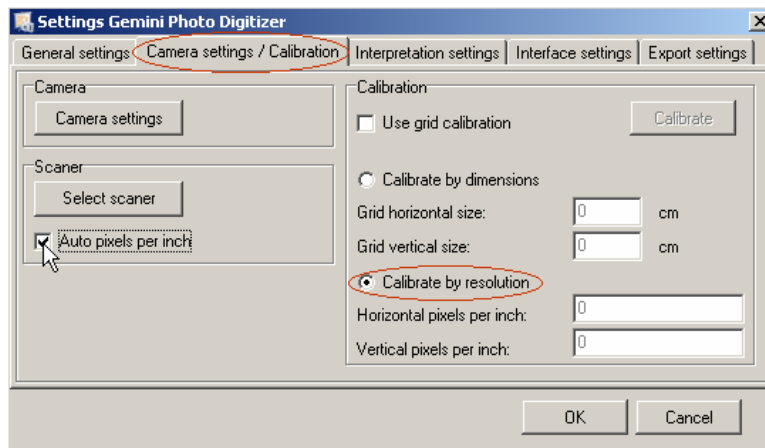
Camera calibration without grid



If you don't use a grid for calibration you can introduce horizontal and the vertical dimension of picture in "Camera settings / Calibration" tab from "Settings Gemini Photo Digitizer" window. This dimension must be very precise to obtain a correct calibration.

To enable the "Grid horizontal size" and "Grid vertical size" options you must uncheck the message "Use grid calibration".

3.2. Scanner calibration

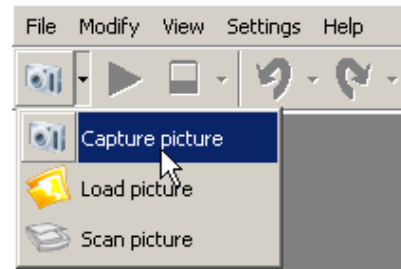


To make the scanner calibration you must click on Settings menu and you have to select the "Camera settings / Calibration" tab. Here you will check "Auto pixel per inch" if you want to automatically calibrate the scanner. If you want to calibrate manually you must uncheck "Auto pixel per inch", then check "Calibrate by resolution" and introduce the resolution (number of pixels per inch for horizontally and vertically). If the introduced resolution is not correct, the detected pieces will have wrong dimensions.

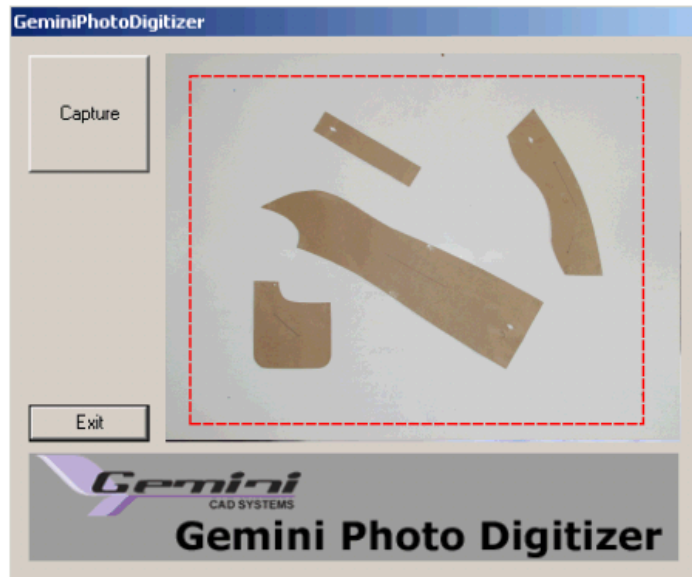
4. How to load pictures

4.1 Capture a picture

For supported cameras, you can capture pictures using the Gemini Photo Digitizer application. To capture you must click on the extension of "Capture / Load" button and you have to select "Capture picture" option.



If your camera is connected and is ready to capture, will appear a window:



You can press "Capture" button to take the photo if the picture from preview is ok.

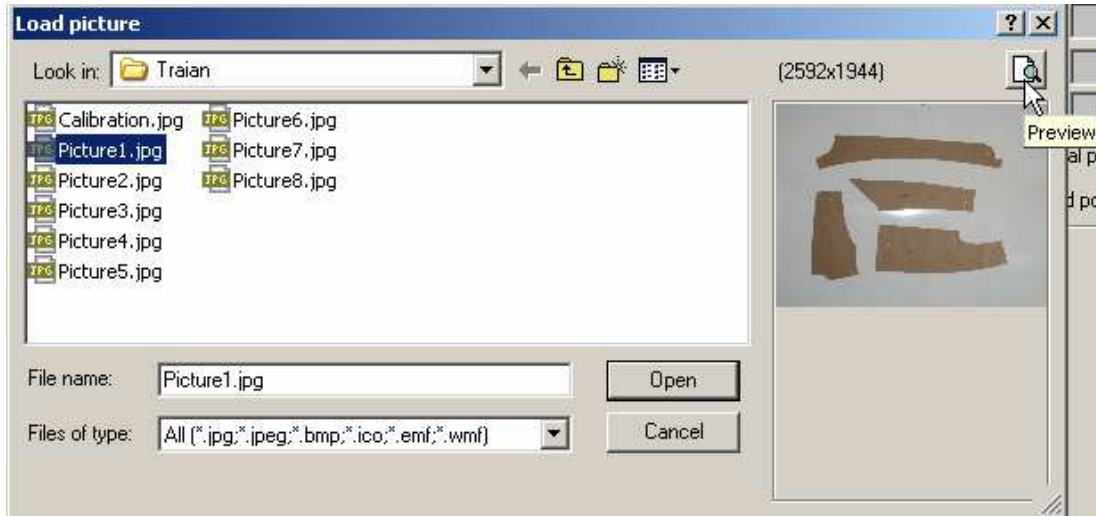
In the preview, you can check if the pieces are placed in the active area. The active area for digitizing is marked with a red rectangle on Capture window. The captured picture will be load automatically in Gemini Photo Digitizer. If you consider that the picture from preview must look different, than you have to exit from this window and you have to change camera settings. If you don't want to capture than you have to make click on "Exit" button.

4.2 Loading a picture

If it is used a camera that has no soft support from Gemini Photo Digitizer this one must have the recommended characteristics. In this case the user will take photos on camera memory, will download them on PC and will load the pictures on Gemini Photo Digitizer. To load a picture from disk, the user must click on the extension of "Capture / Load" button and must select "Load picture" option.



If the option "Load picture" was selected, will appear the window that allows you to search and view the picture.



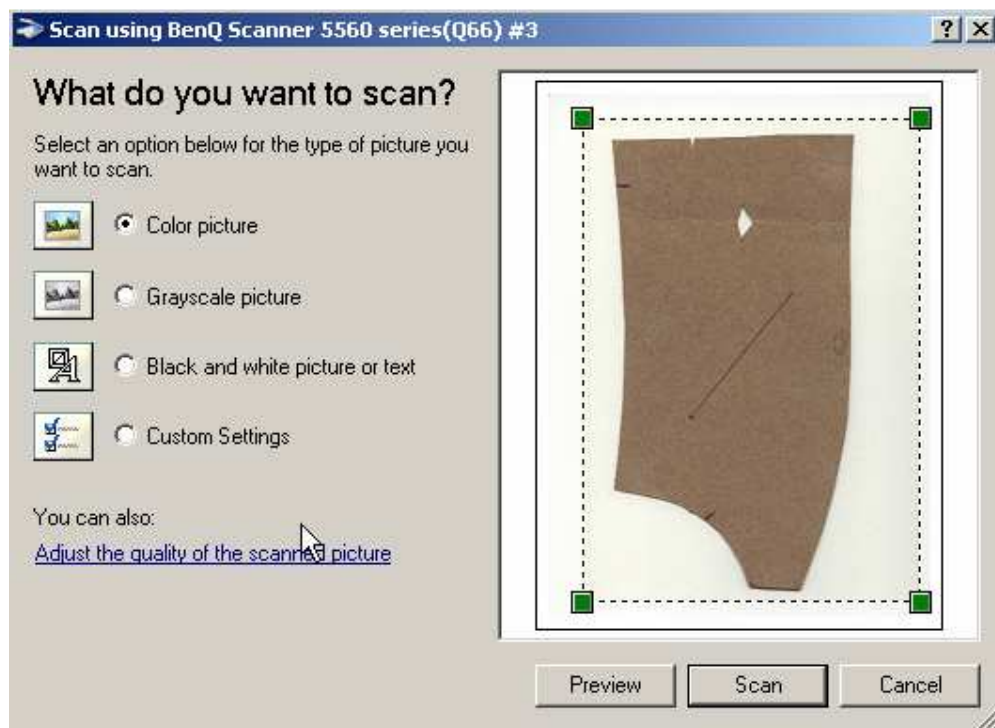
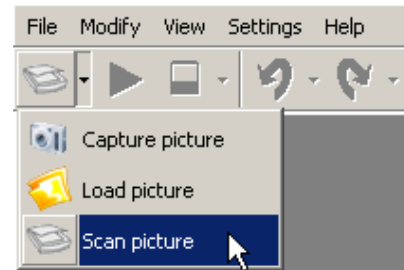
In the right part of this window, you will find a preview area and a preview button. Over the picture preview, the user can see the picture resolution. If the user will press the preview button will see the picture on entire screen. You can load in Gemini Photo Digitizer this types of files: jpg, jpeg, bmp, ico, emf, wmf. After selecting the picture, you must press "Open" button to load it.

4.3 Scanning a picture

You can capture pictures using a scanner. To capture you must click on the extension of "Capture / Load" button and you have to select "Scan picture" option.

If you have many scanners connected to your computer, before scanning a picture you must select the used scanner. For this, you have to go on Settings menu on "Camera settings/Calibration" tab and you have to press "Select scanner" button. From opened list, you have to select the scanner that will be used.

After selecting the "Scan picture" option, the scanner application will be opened.

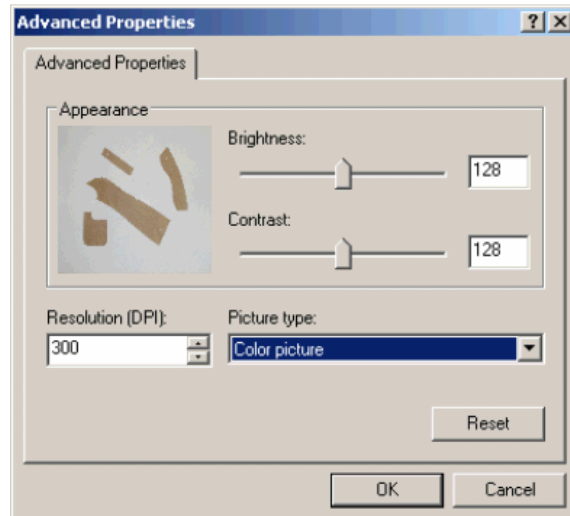


In this application, you have to make all settings for a correct capture. You have to set the resolution according scan characteristics.

The scan preview will help to see if the settings are proper.

Attention! Do not scan on gray scale or only black and white because the picture will have the "Bit Depth" smaller than 24.

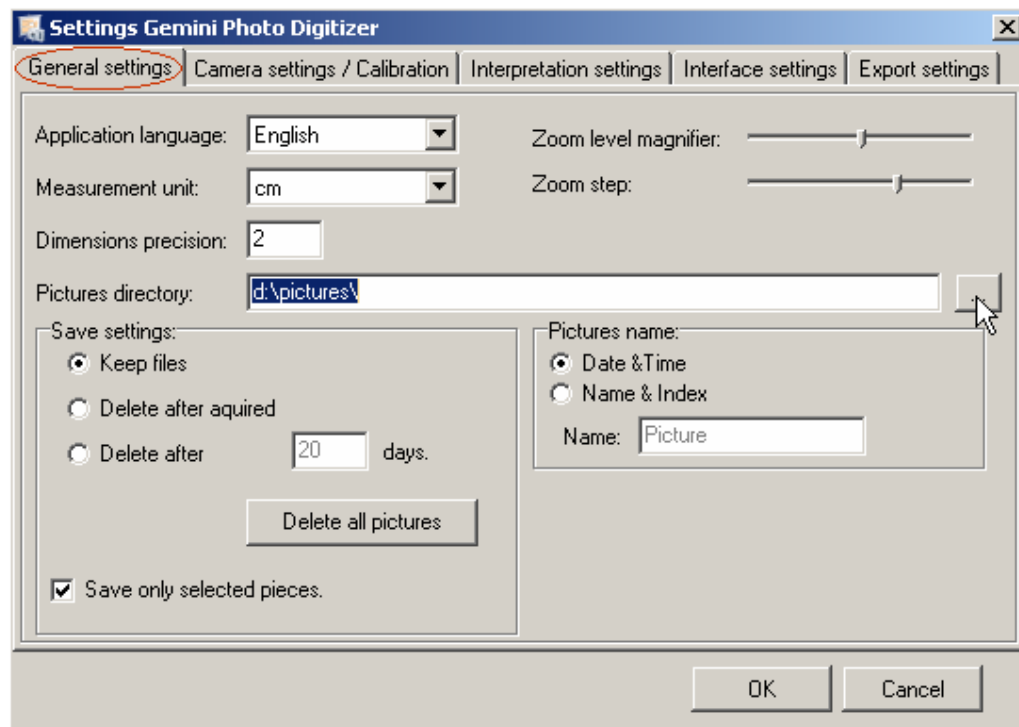
In addition, it is not recommended to capture pictures with "Bit Depth" bigger than 24.



4.4 How to save a captured/scanned picture

The captured/scanned pictures are automatically saved in a specific folder. By default this folder is on drive D and is named Pictures. If there is no drive D, the saving folder will be automatically created on drive C.

The saved picture will receive automatically a name. The name is a set of characters, which can represent the date and the hour of saving or a name and an index.

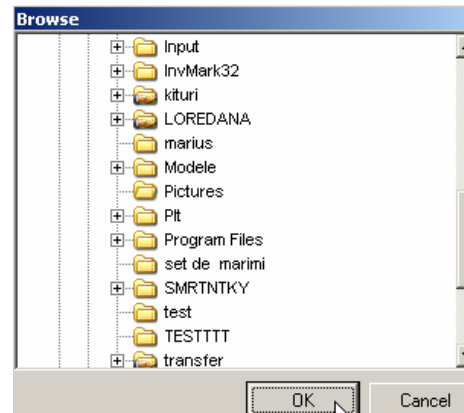


If the user want to save the captured/ scanned pictures in a different location, than he can change this on "Settings Gemini Photo Digitizer" window, "General settings" tab. Here he can change the "Pictures directory:" by pressing Browse button.

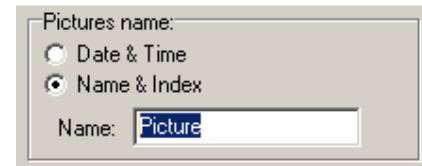
In the "Browse" window, he must select the new path for saving the pictures. After selecting the new folder for save must press "OK" button.

In "Pictures directory:" must appear the new selected path.

To keep this new path the user must press "OK" button from "Settings Gemini Photo Digitizer" window.

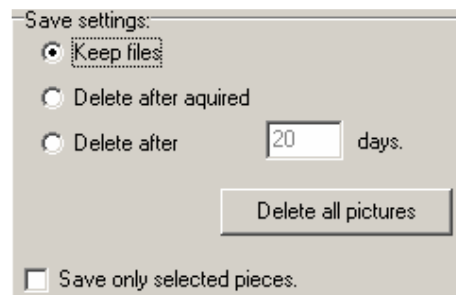


To set the name of the captured picture the user must make the settings in "General settings" tab from "Settings Gemini Photo Digitizer" window. On "Pictures name" can be established if the name of the picture will be a set of characters by type "Date&Time" or "Name&Index". If the user checked the "Name&Index" type, than he can introduce a desired name for the pictures. By default this name is "Picture". The name can be introduced in the "Name:" edit. This edit is enabled only when "Name&Index" is checked. Automatically, to the introduced name will be added an index.



To choose the saving mode the user has to enter in "General settings" tab from "Settings Gemini Photo Digitizer" window. In "Save settings" area can be set if the pictures will be kept, immediately deleted or delete after a number of days.

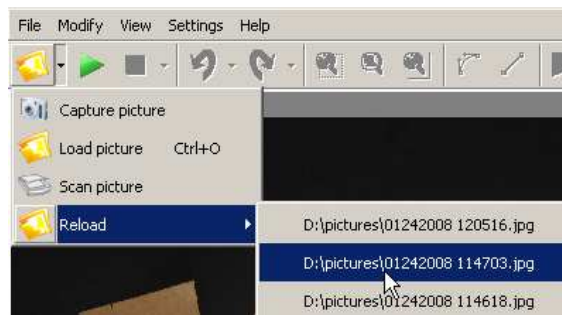
You can also find a button that allows deleting all pictures from saving folder. Please be careful and do not press it if is not necessary.



4.5 How to reload a picture

If you need to reload quickly a picture used before you can use "Reload" option from the menu opened after you clicked on the extension of "Capture / Load" button. When the mouse cursor will be on "Reload" automatically will be displayed the list of the latest opened pictures. The list will contain maximum 15 files. To load a picture opened before just make click on it on reload list.

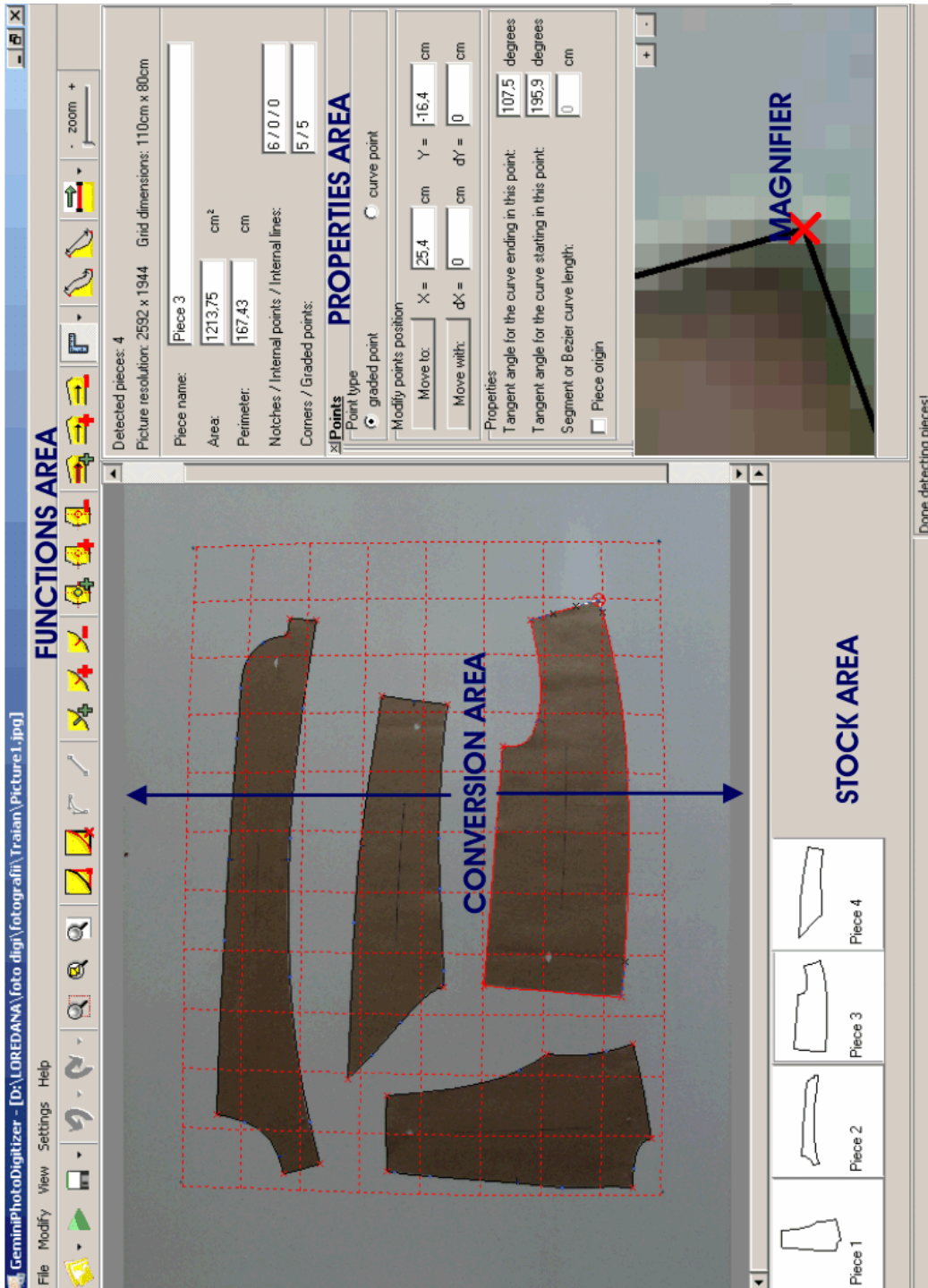
You can use "Reload" option also from "File" menu



5. Gemini Photo Digitizer main window

The Gemini Photo Digitizer window is structured in:

- Functions area
 - Conversion area
 - Stock area
 - Properties area
 - Magnifier
- functions menu and the button bar
 - in this area it is displayed the pictures and the detected contours
 - is a graphic list of detected pieces
 - here are displayed the picture properties, the piece properties and the properties of selected element (point, segment, internal line, internal point)
 - a zoom area which allow checking the detected piece contour



A. Conversion area

In this area it is displayed the picture that must be convert and the detected contours.

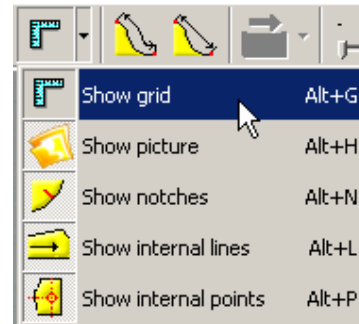
For the conversion area, the user can set to display the grid used for calibration. For this the user must press the button "Show grid" from button bar.

To hide the grid you have to press again the "Show / Hide grid" button.

Viewing the grid is very helpful to know if there are pieces outside. If there are pieces outside the grid then the conversion will not be done properly.

There is also a warning message that announces the user if there are pieces outside the grid.

Also for this area the user can choose to display or to hide the notches, the internal lines or the internal points.



B. Stock area



In the Stock area will appear the images and the names of all detected pieces. The stock area is placed in the bottom of Gemini Photo Digitizing application. The stock area will appear only after the piece contour detecting.

C. Properties area

Detected pieces: 4
Picture resolution: 2592 x 1944 Grid dimensions: 110cm x 80cm

Piece name:

Area: cm²

Perimeter: cm

Notches / Internal points / Internal lines:

Corners / Graded points:

Points

Point type
☒ graded point ☐ curve point

Modify points position
 Move to: X = cm Y = cm
 Move with: dX = cm dY = cm

Properties
 Tangent angle for the curve ending in this point: degrees
 Tangent angle for the curve starting in this point: degrees
 Segment or Bezier curve length: cm
☒ Piece origin

In this area, the user can see:

- the picture properties
- the piece properties
- the properties of selected element (point , internal point, segment or internal line)

Picture properties

On picture properties will be displayed the resolution of loaded picture, the active area dimensions and the number of detected pieces.

Piece properties

In this area will be displayed the properties of the selected piece.

The user can edit the piece name. The piece name will appear over the grain axis and on stock area under the piece image.

Automatically is computed and displayed the area and the perimeter of the selected piece.

Also the user will see the number of notches, internal points, internal lines, corners and graded points from selected piece.

The properties of selected element

Points and segment length

If you have selected a point you can see its type, the X and Y coordinates from piece origin and the tangent angles for the curves which start and end up in it.

On a selected point, you can set the piece origin by checking the message "Piece origin".

There is also the possibility to modify the point position by using "Move to" and "Move with" buttons.

To see the segment or curve length it is necessary to select it using rectangle selection.

Internal line

If you have selected an internal line, in this area will be displayed the type of it and its position relative to piece origin. Here you can change the type and the position.

Internal line type:

Grain axis

Simple line

Grain axis

X = 18 cm

Y = -2 cm

Angle: 77 cm

Length: 4.68 cm

Apply

D. Magnifier

The magnifier is a zoom area, which allows checking the detected piece contour.

The area indicated by click in conversion area will be displayed in magnifier area. The current cursor position it is marked in magnifier area with a blue cross. You will be able to see it only if your cursor current position is in zoomed area that is displayed in magnifier area.

If you are moving a point or a segment, you can see the selected element in magnifier only if you kept press the SHIFT key. Or you can use right mouse click to display in magnifier area the current position of your mouse cursor.

The user can establish the zoom level of magnifier in "Settings Gemini Photo Digitizer" window, "General settings" tab.

Settings Gemini Photo Digitizer

General settings | Camera settings / Calibration | Interpretation settings | Interface settings | Export settings

Application language: English

Measurement unit: mm

Dimensions precision: 2

Pictures directory: d:\pictures\

Save settings:

☒ Keep the images

☐ Delete after capturing

☐ Delete after 20 days

Delete all pictures

Pictures name:

☒ Data&Time

☐ Name & Index

Name: Picture

Zoom level magnifier: [Slider]

Zoom step: [Slider]

OK Cancel

You can change the zoom level using the track bar from "Zoom level magnifier:" option. If you are moving the track bar to the left the zoom level will be smaller. If you are moving the track bar to the right the zoom level will be bigger.

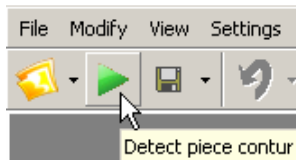
You can modify the magnifier zoom level using **+** and **-** buttons to increase or decrease it. Those buttons are placed in magnifier area.

You have also the possibility to increase or decrease the zoom level using "+" and "-" from Numpad keys.

Below the track bar for magnifier you can also increase or decrease the zoom step of "Conversion area" (in this area the zoom in and out tool is the scroll of the mouse) using the track bar from "Zoom step:" option.

6. Contour detecting

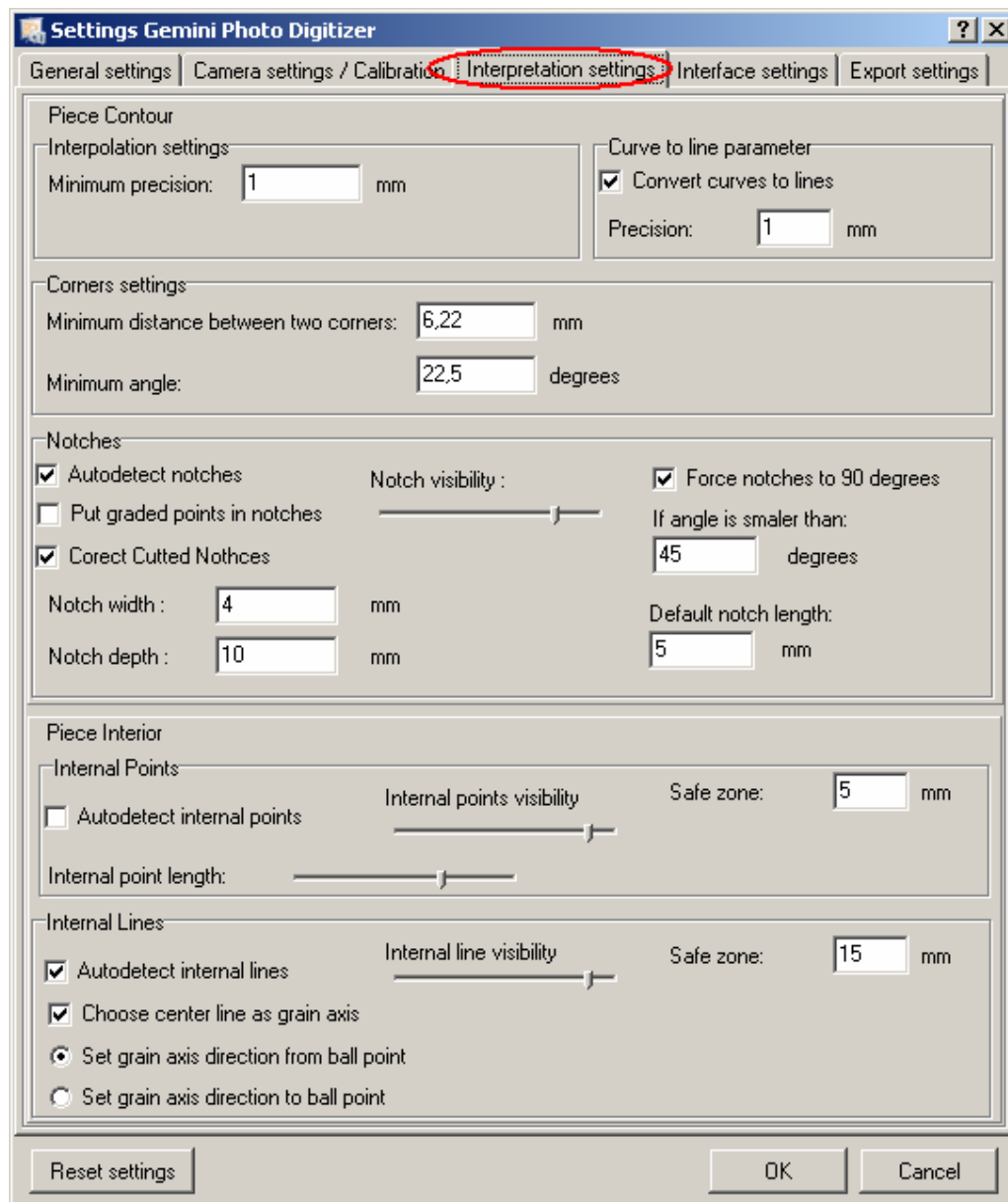
After capture or loading a picture, the Gemini Photo Digitizer can detect automatically the pieces contours. Also will be automatically detected the notches, the internal points and the internal axes.



For this, you must press "Detect piece contour button" from application button bar or you can select this option from "File" menu.



The pieces contours will be automatically detect according to the "Interpretation settings" from "Settings Gemini Photo Digitizer" window.



In Interpretation settings, the user can establish the corner settings, interpolation settings and curve to line conversion.

Interpolation settings	
Maximum deviation	Interpolation is a function that insures the conversion of straight segments from automat detection into Bezier curves with an accurate following of the initial contour. Here you can set the maximal deviation of the resulted contour after interpolation related to the piece contour. For a smaller deviation there is an accuracy increase. By default, it is set at 0,1cm.
Curve to line parameter	
Convert curves to lines	If this option is checked, the curves with control points situated at a distance smaller than approximation value will be converted to lines.
Approximation	Recommended value is 2 or 3 mm.
Corner settings	
Minimum distance between two corners	The distance between two corners must be bigger than the introduced value. If you must detect pieces having many corners very close one to another you must change the value from "Minimum distance between two corners" By default, it is set at 1 cm.
Minimum angle	The user can set the minimum value for a corner angle. If on conversion for a point will be found an angle smaller than the introduced value, than that point will not be a corner point. The recommended values for the minimum angle are between 20 and 30 degrees. By default, it is set at 22.5degrees.
Set corners as graded points	The user can set the type of point that will correspond to a corner. The points from piece contour can be cusp or can be smooth. All the time a corner point will be a cusp point. Even if you uncheck this message and corners will be marked as curve points, the corners will not be interpolated and will remain cusp. By default, this option is checked and the corners will be detected as cusp graded points.
Notches	
Autodetect notches	If this function is checked, the notches will be detected automatically in the same time with the piece contour.
Force notches to 90 degrees If angle is smaller than:	The setting " Force notches to 90 degrees " will be applied only if the angle between the detected notch and the segment on which it is placed is smaller then the value which you enter on " If angle is smaller than: ".
Default notch length	If you enter a value in the field of this option all the notches will have the dimension entered in this field. The new created notches will have the length set here as default.
Put graded points in notches	If this option is checked, automatically, for each detected notch will be added a grading point on pattern contour.
Corect Cutted Notches Notch width: Notch depth	For patterns with cutted notches, not drawn notches, you can use this option to detect the cuttings from contour as notches. For this you must set the width and the depth values. Each cutting from piece contour which has the width and depth values as you set will be detected as notches.
Notch visibility	If you will change the track bar position you will set the visibility level for detected notches. The position that you set here will be initial position of notch visibility track bar from main window of Gemini Photo Digitizer. The maximum left position will allow detecting as notches only the best marks for notches from patterns. The maximum right position will allow detecting as notches all the marks from patterns which appears as notches.

Piece interior	
Internal points	
Autodetect internal points	If this option is checked, the internal points will be automatically detected while detecting the piece contour. If this function is not checked than, you must use "Detect internal points in the selected area" button from functions area of the main window, to detect the internal points.
Internal point length	Here the user must set the length (in pixels) for the internal points that must be automatically detected. When the user is changing the position of the track bar a hint is displayed. The hint is indicating the value in pixels.
Internal points visibility	If you will change this track bar position you will set the visibility level for detected internal points. The position that you set here will be initial position of internal points visibility track bar from main window of Gemini Photo Digitizer. The maximum left position will allow detecting as internal points only the best marks for inner points from patterns. The maximum right position will allow detecting as internal points all the marks from patterns which appears as inner points.
Safe zone	The user can set allowance for the edge of the pattern. This must be set to not detect in the specified zone the internal points. The minimum value for the safe zone is 5mm. If you will introduce a smaller value for the safe zone, automatically will be considered of 5mm.
Internal lines	
Autodetect internal lines	If this function is checked the internal lines will be detected automatically in the same time with the piece contour. If this function is not checked than, you must use "Detect internal lines for the selected piece" button to detect the internal lines, from functions area of the main window.
Safe zone	The user can set allowance for the edge of the pattern. This must be set to not detect in the specified zone the internal lines. The minimum value for the safe zone is 5mm. If you will introduce a smaller value for the safe zone, automatically will be considered of 5mm.
Internal line visibility	If you will change this track bar position you will set the visibility level for detected internal lines. The position that you set here will be initial position of internal line visibility track bar from main window of Gemini Photo Digitizer. The maximum left position will allow detecting as internal lines only the best marks for inner lines from patterns. The maximum right position will allow detecting as internal lines all the marks from patterns which appears as lines inside contour.
Choose center line as grain axis	If will be checked the option "Choose center line as grain axis" from "Interpretation settings" window will be detected like grain axis the longest and the most centered interior line (in case in which the grain line are not marked with an boll point).
Set grain axis direction from ball point Set grain axis direction to ball point	Grain axis direction will be detected in correlation with the ball point and checked option in "Interpretation settings" . The user can decide to detect the grain axis direction to or from the mark (ball) point. The user must draw a ball point on grain axis from digitized patterns and he must check one of these two options according grain axis direction.
Reset settings	If you changed the settings from this tab and you want to set again all default option you must press "Reset settings" button.

7. Checking the detected contour

7.1 Play piece contour. Play grade points

After automat detection of contours, you must check the conversion. You have to check the contour, the corners, the curves, the notches, the internal lines and the internal points.

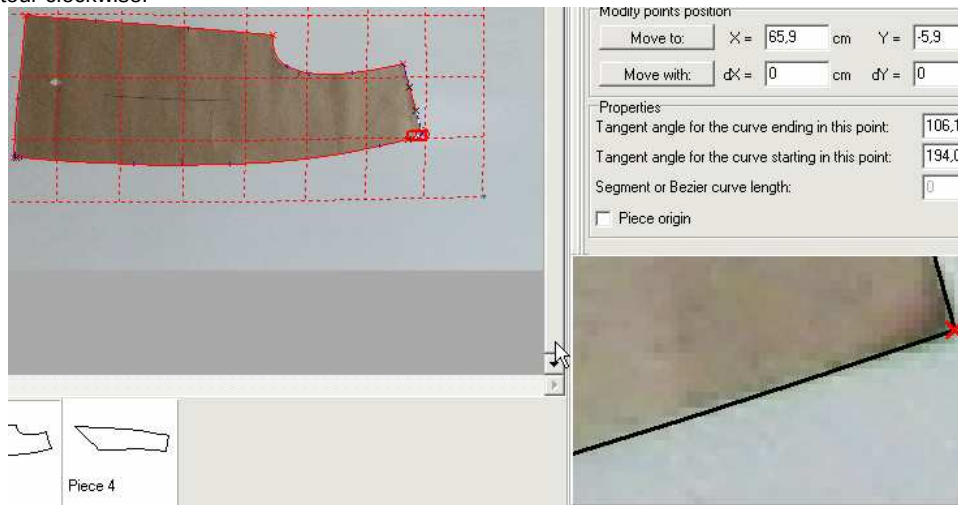
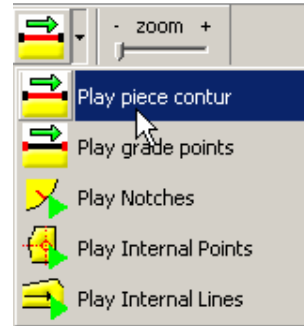
To cover the entire piece contour you can use "Play contour" function. To access this function you must click on the extension of Play button from button bar. Will be displayed a list of play functions. From this list, you must select "Play piece contour".

To move along piece contour, after selecting the play mode, you can use the wheel of the mouse or the mouse buttons.

If you will roll the mouse wheel frontward, you will move on contour in clockwise.

If you will roll the mouse wheel backward, you will move on contour in counterclockwise.

You can use the mouse buttons to move along selected piece contour. If you are making click on the left button you will move on contour in counterclockwise. If you are making click on the right button you will move on contour clockwise.

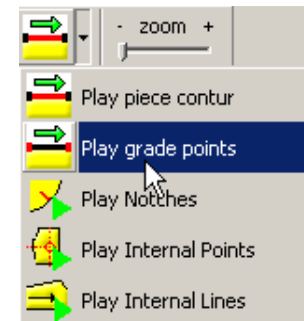


On piece contour, will appear a red rectangle. This rectangle will indicate the played zone. The marked zone will be displayed in magnifier on a bigger scale.

You can move on piece contour from graded point to graded point. This will help to check the detected corners. To access "Play grade points" function you must click on the extension of Play button from button bar. Will be displayed a list of play functions. From this list, you must select "Play grade points". As for Play piece contour, you can move from point to point using the mouse wheel or the mouse buttons. If you will roll the mouse wheel frontward, you will move from point to point in clockwise.

If you will roll the mouse wheel backward, you will move from point to point in counterclockwise. If you are making click on the left button you will move in counterclockwise. If you are making click on the right button you will move in clockwise.

The played grade point will be marked with a red rectangle.

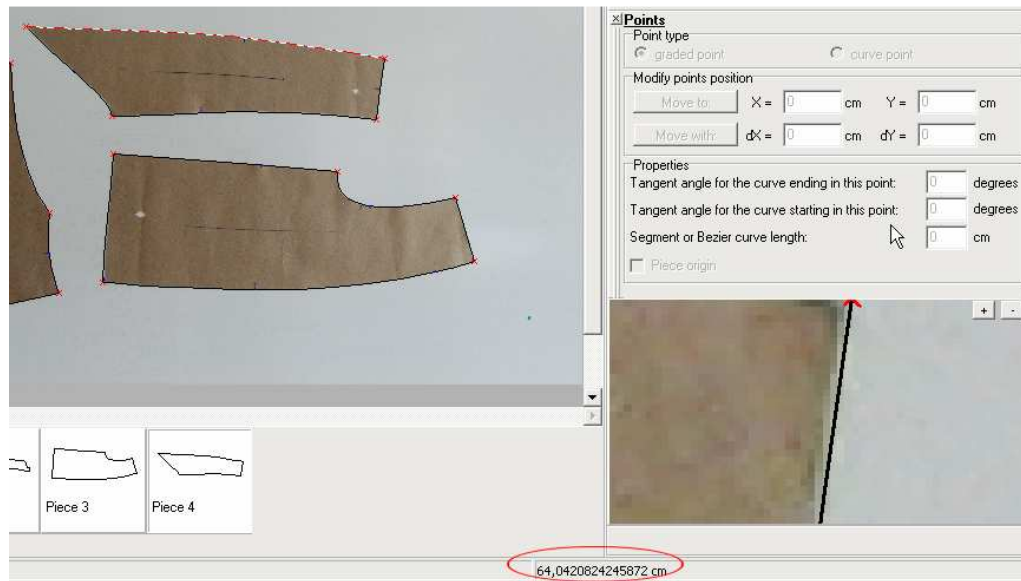


When you are in play mode all the other function are disable. To go out from play mode you must click on any other button from application button bar or you can press ESC key from keyboard.

7.2 Measuring pieces

Besides checking the shape of the detected pieces (corner, curves) you must check the piece dimensions. For this Gemini Photo Digitizer offer three functions: "Measure on perimeter", "Measure distance between two points" and "Show measurements on piece contour".

The measured distance is displayed in the lower part of the screen, on information bar.



A. Distance measurement on the piece perimeter

If you measure the distance starting from a point, going along the contour and ending in the same initial point, you will obtain the perimeter value of the selected piece; the perimeter value is also automatically displayed on Piece properties.

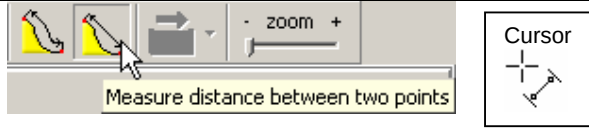
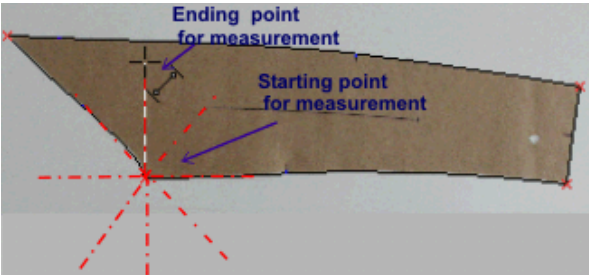
	Cursor	In the button bar, click on « Measure on perimeter » button.
		Click on the first point to start the distance measuring.
		Follow the piece contour clockwise up to the final point or notch for measuring. Click on that point or notch. The measurement result is displayed in the lower application bar.

B. Distance measurement between two points on a straight line

The measurement on straight line can be done from any position on the piece (inside, on the contour or outside), not only from point.

- Click on the place where you want the start the measurement. If the chosen place is too close to the piece contour, the program will start the measurement from the closest point on the piece contour.
- Move the cursor and click on the final position for the distance measurement. This position can be a point on a piece, a point on the contour or on any other position inside or outside the piece. The measured distance is displayed in the upper menu for the base size and also for the graded sizes.

Pressing the CTRL key can set the precise direction of measurement. After select the initial point of measurement, press the CTRL key and you can precise direct the measurement for 15 to 15 degree.

	In the button bar you must click on « Measure between two points » button.
	Click on the first point to start the distance measuring. This point can be a point on the piece contour or a point inside the piece. After first point selection will remain active all mentioned elements (points, notches, technical internal points), less the first point selected.
	Move the cursor and click on the final point to measure the distance. Will be automatically displayed in the lower application bar the measured distances.
	You can press the CTRL key to set the precise measurement direction. After select the starting point of measurement, if you press CTRL key the measurement can be precise directed from 15 to 15 degree.

C. Show measurements on contour

“Show measurements on contour” is a completely automatic function which will display on screen the dimensions for each segment between two grading points on all detected patterns.

In the button bar you must click on « Show measurements on contour » button.



On each detected pattern will be displayed with blue color the contour dimensions. The dimensions are displayed for each segment (Bezier curve or line) between two grading points.

The displayed measurements are permanently and automatically recalculated, each time when you modify the piece shape, thus, the

designer can watch in real time any measure adjustment even during piece modifications.

8. Modifications on piece contour

8.1 Add new point; delete a point

To add a new point click on the piece contour where you want to add a new point and then click on « Modify » menu and select Points / Add point option. A new point can be added by a mouse double click on the piece contour. Adding a new point does not change the piece shape.

Click on the piece contour where you want to add the new point	Select "Add point" option from "Modify / Points" menu Or make double click on piece contour.	The new point has been added and the piece contour remains unchanged.

To delete a point: click to select the point and then click on « Modify » menu and select "Points / Delete point" option or press on DELETE key. A point can be rapidly deleted by a fast double click with the left mouse button. After deleting a point, the piece shape is changing and the Bezier curve that remains instead the point will approximate inaccurately the previous contour.

Select the point to be deleted	Click on « Delete points » from "Modify / Points" menu or press DELETE key. Also you can delete if you make double click on the selected point.	The point was deleted; the piece contour is a little bit modified following the point deletion.

8.2 Move points

The mouse can rapidly move a point. To do this, you must select the point. The movement is done directly by mouse drag.

If you are moving a point with the mouse press SHIFT key to watch in magnifier the selected point.

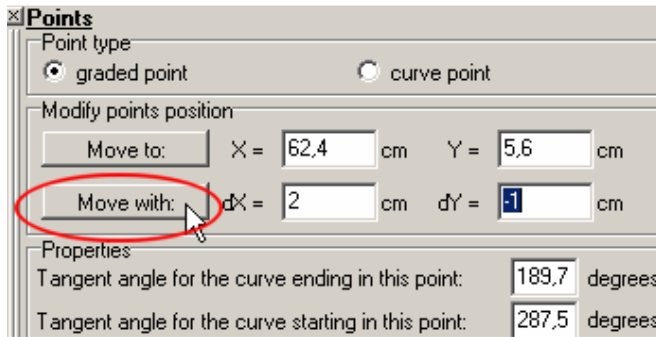
You can move a point also by setting the exact coordinates. Horizontal (X axis) and vertical (Y axis) coordinates for each point are registered according to the piece origin that is represented by one of the piece points.

When you select a point, the point coordinates from the origin are displayed in properties area.

The point can be « moved to » another coordinates by changing the values in the specific boxes. The numerical values can be positive or negative, according to point position from the origin point.

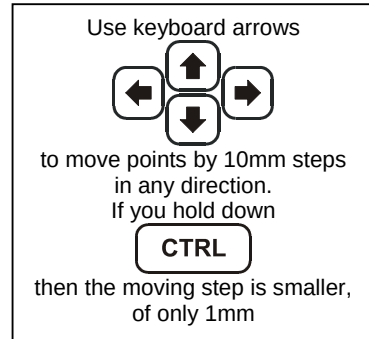
After entering the new point coordinates you must press ENTER or to click the « Move point to: » button, for the changes to be effective.

ATTENTION: if the moved point is the origin point, after movement its coordinates remain X=0 and Y=0 because the piece origin is displaced together with this point.



A selected point can be moved horizontally and vertically from its actual position. To do this, you must enter the displacement distances in the specific boxes. For the changes to be effective, you must press ENTER or click on « Move point with » button.

You can also move the point using the keyboard arrows. To do this, you must select the points first. On each arrow key press (UP, DOWN, LEFT, RIGHT), the points will move for 10 mm in the specific direction. If you hold down CTRL key while pressing the keyboard arrows then the moving step will be only 1 mm so the movement will be more precise. Point movement using the keyboard arrows is very useful for a fast piece shape adjustments.



8.3 Transform line into curves and curves into lines

A line segment can be converted into a curve, to modify its shape.

Select the line to be converted into a curve	Click on «convert line to curve» button.	The line has been converted to a curve; the control points appear	The curve shape can be modified by moving the control points or by dragging the curve.

A curve segment from the piece contour can be converted into a line. The curve shape is lost and between the two points appears a line.

Select the curve segment to be converted to a line	Click on « Convert curve to line» button	Between the two points, the curve was converted to a line

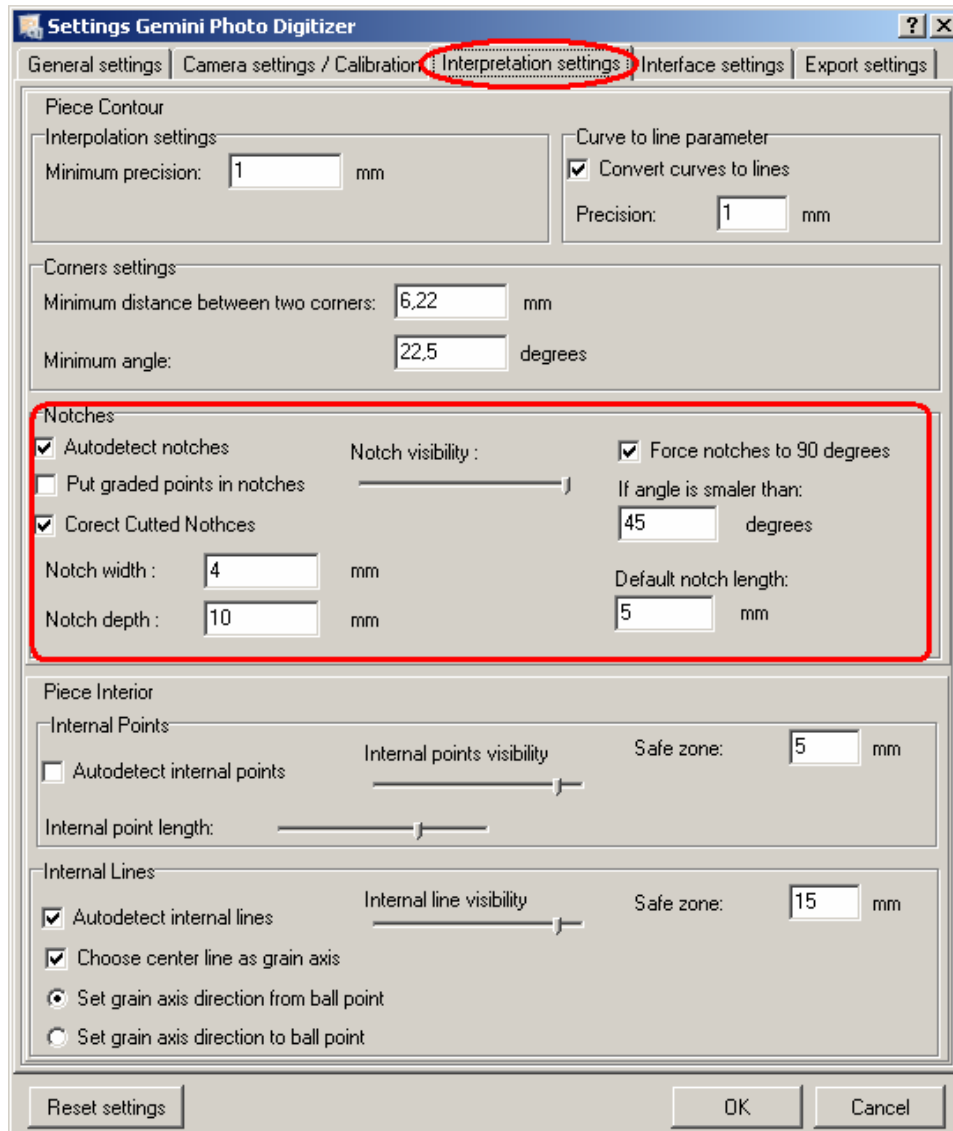
9. Notches

9.1 Detect notches

To be precise detected, the notches from the digitized pattern must be drawn as one small line not to bolded, must have at list 0.5 or 1.5 cm in length and must be drawn at the correct angle.

The notches are detected automatically in the same time with the piece contour only if the function "Autodetect notches" from "Interpretation settings\Settings Gemini Photo Digitizer" is checked.

For detected notches the user has the possibility to set the angle, the length and type. All these settings must be done in "Interpretations settings" tab from "Settings Gemini Photo digitizer" window.



The detected notches can be positioned at 90 degrees or can keep the angle from the picture. If the user will check the option "Force notches to 90 degrees" for all the notches placed at a smaller angle than is set in "If angle is smaller than" the angle between the notch and the segment on which is placed will be 90 degrees.

All detected notches will have the length introduced in corresponded field of "Default notch length".

For patterns with cutted notches you can use the option "Correct cutted notches" from the window "Interpretation settings". This option allows the detection of the cutted notches which are in the dimensions set by the user inside the following fields: "Notch width" and "Notch depth" under the "Correct cutted notches" field.

In the detected notches it is possible to add automatically or manually grading points. For adding grading points automatically the option "Put graded points in notches" from "Interpretation settings" window must be checked. If that option it is not checked and the user wants to add a graded point manually, first must be selected the notch, than in the right menu will be checked the option "Graded point in notch".

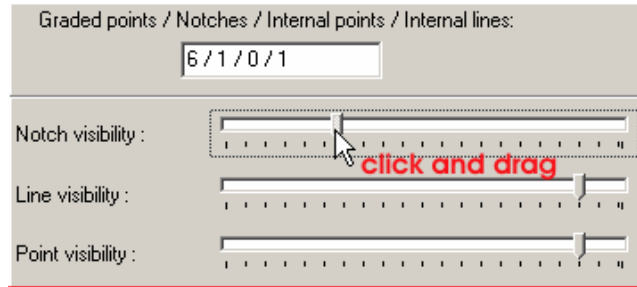
You can set the visibility level for detected notches. The track bar position for notch visibility from "Interpretation settings" will be initial position of notch visibility track bar from main window of Gemini Photo Digitizer.

The users have the possibility to adjust and follow in real time the visibility level of notches.

For the patterns that contain lines, points or spots that shouldn't be found on the surface of the pattern can be used three track bars for visibility set. To see the visibility track bars on main window right panel you must assure that you have no internal element or notch selected. To adjust and follow in real time the visibility level of notches you must click and keep the left mouse button while you drag from track bar cursor.

The maximum left position will allow detecting as notches all the marks from patterns which appears as notches.

The maximum right position will allow detecting as notches only the best marks for notches from patterns.

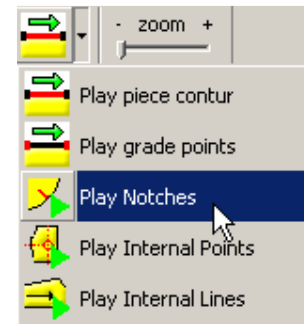


To check if all notches were detected you can use "Play notch" function. This function will allow you to move on piece contour from notch to notch. To access "Play notches" function you must click on the extension of Play button from button bar. Will be displayed a list of play functions. From this list, you must select "Play notches". You can move from notch to notch using the mouse wheel or the mouse buttons. If you will roll the mouse wheel frontward, you will move from notch to notch in clockwise.

If you will roll the mouse wheel backward, you will move from notch to notch in counterclockwise. If you will make click on the left button you will move in counterclockwise. If you will make click on the right button you will move in clockwise.

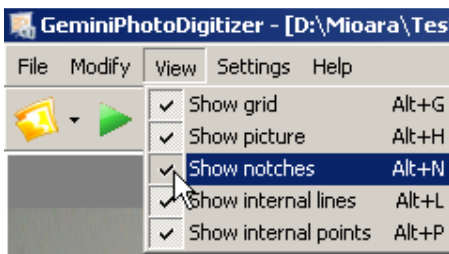
The played notch will be marked with a red rectangle. While using "Play notch" function you can delete the displayed notch. In order to do this you must press DELETE button from keyboard. Automatically will be displayed next notch from piece contour.

When you are in play mode all the other function are disable. To go out from play mode you must click again on "Play" button from application button bar. Besides, you can use ESC key from keyboard to go out from this mode.



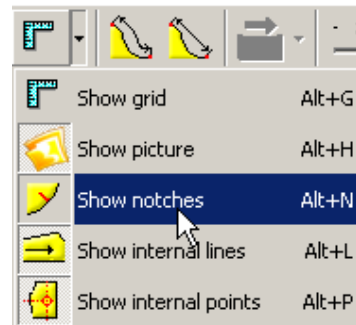
The user has also the possibility to display or to hide the notches from detected pieces.

To display or to hide the notches on detected pieces you can use the option "Show notches" from "View" menu. If in "View" menu, this option is checked, than the notches will be displayed. If not, the notches will be hidden.



when you make click on the "Show grid" button extension.

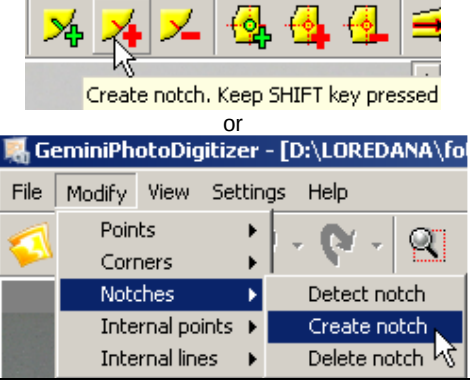
Besides, you can click on "Show notches" button. This button can be accessed from the menu that appears



9.2 Add new notch. Delete notch

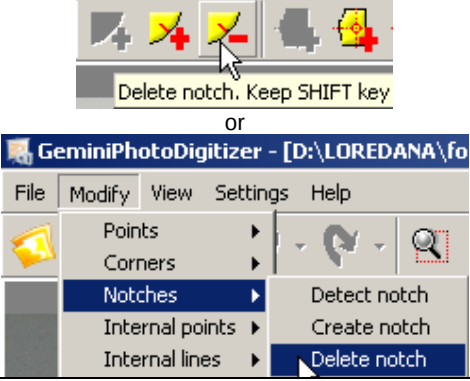
To add a new notch click on "Modify" menu and select "Notches / Create notch" option and then click on the piece contour where you want to add the notch. Besides, you can use "Create notch" button and then click on the piece contour where you want to add the notch.

To add many notches you must keep pressed SHIFT key when you select "Create notch" function (from menu or from button bar). If you want to finish adding notches, you must press ESC key from keyboard or you can click again on "Create notch" function.

 Create notch. Keep SHIFT key pressed or GeminiPhotoDigitizer - [D:\LOREDANA\fo File Modify View Settings Help Points Corners Notches Internal points Internal lines Detect notch Create notch Delete notch		
Select "Create notch" option from "Modify Notch" menu Or click on "Create notch" button.	Click on the piece contour where you want to add the new notch.	The new notch has been added.

To delete a notch: click on « Modify » menu and select "Notches / Delete notch" option and select the notch that must be deleted. Besides, you can use "Delete notch" button from button bar and then click on the notch that must be deleted.

To delete many notches you must keep pressed SHIFT key when you select "Delete notch" function (from menu or from button bar). If you want to finish deleting notches, you must press ESC key from keyboard or you can click again on "Delete notch" function.

 Delete notch. Keep SHIFT key or GeminiPhotoDigitizer - [D:\LOREDANA\fo File Modify View Settings Help Points Corners Notches Internal points Internal lines Detect notch Create notch Delete notch		
Select "Delete notch" option from "Modify Notch" menu Or click on "Delete notch" button.	Select the notch to be deleted (press CTRL key in order to select a notch)	The notch was deleted.

You can delete a notch even while you are using "Play notch" function. If you press DELETE button from keyboard the displayed notch will be deleted and automatically will be displayed next notch.

To delete all notches unless the selected one you must press SHIFT+DELETE keys in same time.

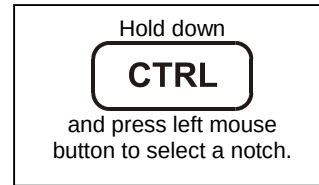
If you hold down **SHIFT** when you select "Create notch" or "Delete notch" function (from button bar or from top menu) you will create or will delete many notches. Press ESC key to go out from this mode.

Hold down
SHIFT
when you select "Create notch" or "Delete notch" to create or to delete many notches.

9.3 Notches properties

To select a notch from a piece you must keep pressed CTRL key when you make click with the left mouse button on the notch.

When the notch is selected has a red color and his marked point has a small red square. Also, when the notch is selected in the right side of the windows are displayed the notch properties.



Distance notch:

Properties:

X = 7,10 mm

Y = 53,62 mm

Distance:

56,52 mm

Length:

5 mm

Angle:

90 degrees

☒ Relative angle

Apply ☐ Graded point in notch

The properties menu for the *distance notch* includes the following information:

- the horizontal and vertical coordinates from the piece origin. You can not edit these coordinates
- the distance up to the mark point, measured along the piece working contour
- the notch length
- notch angle, related to the absolute angle. If you want the notch angle to be expressed as relative angle you must check the box near the message « Relative angle »

The distance up to the mark point, the length notch and the notch angle can be modified from here.

If you want to add a graded point in notch manually, first must be selected the notch, than in the right menu you must check the option "Graded point in notch"

To validate any change in the properties menu, you must click on the « Apply » button.

10. Internal points

10.1 Detect internal points

For bigger accuracy on internal elements detection you must avoid to draw elements near the patterns edges and the text must be as short and as small as possible. Use patterns with fewer texts. Use pen less visible for the texts, for the internal drawings and the seam line.

For internal lines and internal points use black or blue pen for cardboard or white paper patterns. If the patterns are from a different color than white than use a contrast color to mark the internal lines and points.

To be precise detected, the internal points from the digitized pattern must be drawn as two intersected lines of 1 or 1.5 cm length. The lines must be perpendicular on each other and must intersect in the middle.

The internal points are detected automatically in the same time with the piece contour only if the function "Autodetect internal points" from "Interpretation settings\Settings Gemini Photo Digitizer" is checked.

If this function is unchecked, the internal points can be automatically detected if you use "Detect internal points in the selected area" button. Alternatively, you can select "Detect internal point" from "Modify/ Internal points". The internal points will be detected only for the selected piece. If you didn't select any piece, the internal points will be automatically detected on all detected pieces.

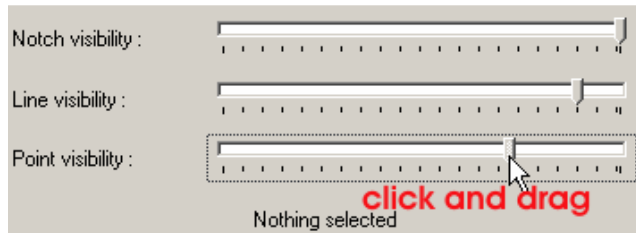
The user can set the length (in pixels) for the internal points that will be automatically detected. This set must be done in "Interpretation settings" window from "Settings". You will see the size displayed in a hint if you will place the mouse cursor over the "Internal point length" track bar.

Select the piece with a mouse click inside its contour. The selected piece must have red contour.	Make click on "Detect internal point in the selected area" from button bar or select the option "Detect internal point" from "Modify/Internal points" menu.	The internal points will appear inside piece contour.

You can set the visibility level for detected internal points. The track bar position for inner points visibility from "Interpretation settings" will be initial position of points visibility track bar from main window of Gemini Photo Digitizer.

The users have the possibility to adjust and follow in real time the visibility level of internal points.

For the patterns that contain lines, points or spots that shouldn't be found on the surface of the pattern can be used three track bars for visibility set. To see the visibility track bars on main window right panel you must assure that you have no internal element or notch selected. To adjust and follow in real time the visibility level of internal points you must click and keep pressed the left mouse button while you drag from track bar cursor.



The maximum left position will allow

detecting as internal points only the best marks for inner points from patterns.

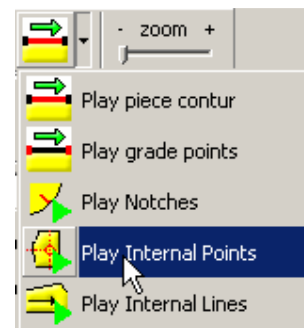
The maximum right position will allow detecting as internal points all the marks from patterns which appears as inner points.

To check if all internal points were detected you can use "Play Internal Points" function. This function will allow you to move from internal point to internal point. To access "Play Internal points" function you must click on the extension of "Play" button from button bar. Will be displayed a list of play functions. From this list, you must select "Play Internal points ". You can move from point to point using the mouse wheel or the mouse buttons.

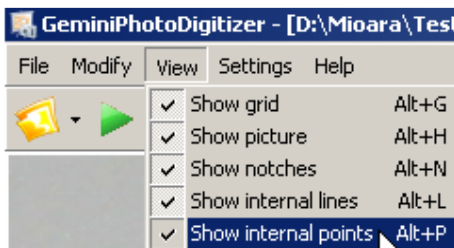
The played internal point will be marked with a red rectangle.

When you are in play mode all the other function are disable. To go out from play mode you must click again on Play button from application button bar. Besides, you can use ESC key from keyboard to go out from this mode.

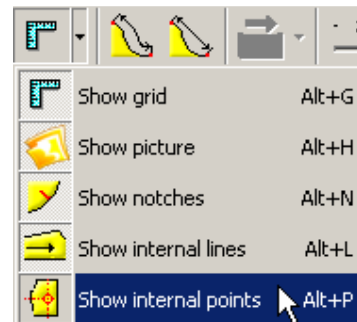
While using "Play Internal Points" function you can delete the displayed point. In order to do this you must press DELETE button from keyboard. Automatically will be displayed next point detected inside piece contour.



The user has also the possibility to display or to hide the internal points from detected pieces.



To display or to hide the internal points on detected pieces you can use the option "Show internal points" from "View" menu. If in View menu, this option is checked, than the internal points will be displayed. If not, the internal points will be hidden.



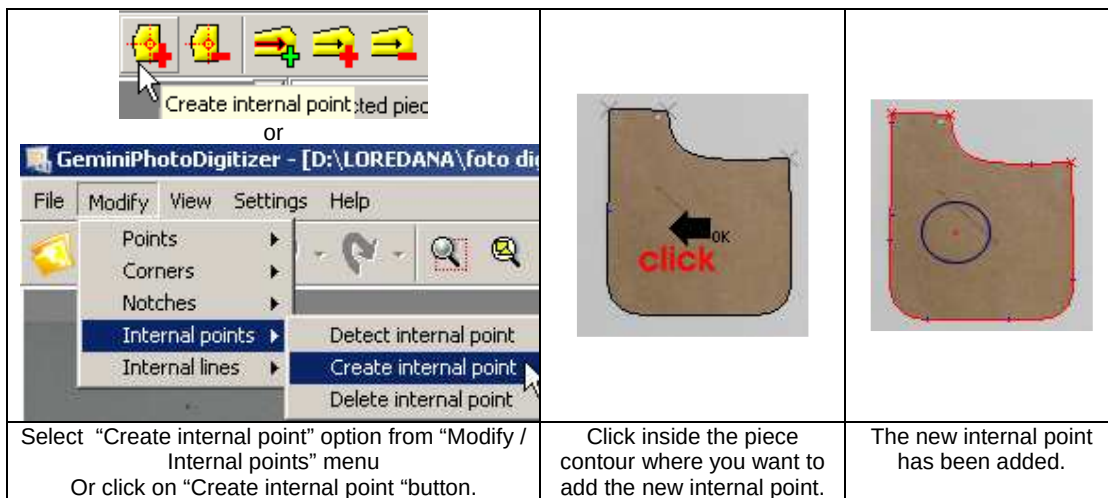
Besides, you can click on "Show internal points" button. This button can be accessed from the menu, that appear when you make click on the "Show grid" button extension.

10.2 Add new internal point. Delete internal point

To add a new internal point click on "Modify " menu and select "Internal points / Create internal point" option "and then click inside the piece contour where you want to add the internal point. Besides, you can use "Create internal point" button and then click where you want to add the internal point.

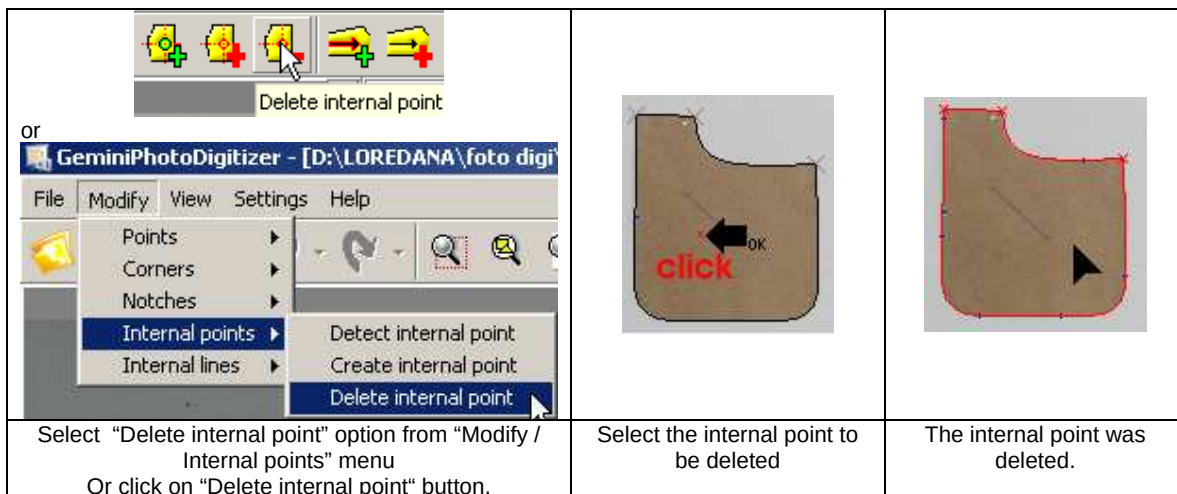
The internal points must be placed inside the pieces contours.

To add many internal points you must keep pressed SHIFT key when you select "Create internal point" function (from menu or from button bar). If you want to finish adding notches, you must press ESC key from keyboard or you can click again on "Create internal point" function.



To delete an internal point: click on « Modify » menu and select "Internal points / Delete internal point" option and select the point that must be deleted. Besides, you can use "Delete internal point" button from button bar and then click on the internal point that must be deleted.

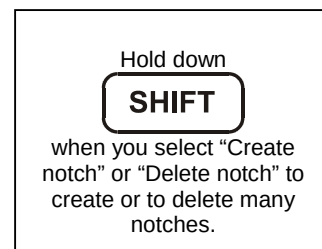
To delete many internal points you must keep pressed SHIFT key when you select "Delete notch" function (from menu or from button bar). If you want to finish deleting internal points, you must press ESC key from keyboard or you can click again on "Delete internal point" function.



You can delete an internal point even while you are using "Play Internal Points" function. If you press DELETE button from keyboard the displayed internal point will be deleted and automatically will be displayed next internal point.

To delete all internal points unless the selected one you must press SHIFT+DELETE keys in same time.

If you hold down **SHIFT** when you select "Create internal point" or "Delete internal point" function (from button bar or from top menu) you will create or will delete many internal points. Press ESC key to go out from this mode.



10.3 Internal point properties

To select an internal point from a piece you must click with the left mouse button on him.

When the internal point is selected has a red color. Also, when the internal point is selected in the right side of the windows are displayed his properties.

The properties menu for the *internal point* includes the following information:

- the horizontal and vertical coordinates from the piece origin.
- the distance up to the mark point, measured along the piece working contour
- the internal point length

These properties can be modified.

To validate any change in the properties menu, you must click on the « Apply » button.

11 Internal lines

11.1 Detect internal lines

For bigger accuracy on internal elements detection you must avoid to draw elements near the patterns edges and the text must be as short and as small as possible. Use patterns with fewer texts. Use pen less visible for the texts, for the internal drawings and the seam line.

The texts must be as small as possible and must be at list at 1 cm distance from the internal lines.

For internal lines and internal points use black or blue pen for cardboard or white paper patterns. If the patterns are from a different color than white than use a contrast color to mark the internal lines and points.

You must avoid drawing internal lines till the pattern edges. The longer internal line will be detected as grain axes. It is recommended to draw the internal line as it is possible in the middle of the pattern. If you will mark one end of the grain axes with a spot (ball), that end can be interpreted on conversion as the direction of the grain axes.

The internal lines are detected automatically in the same time with the piece contour only if the function "Autodetect internal lines" from "Interpretation settings\ Gemini Photo Digitizer" is checked.

If this function is unchecked, the internal lines can be automatically detected if you use "Detect internal line" button. The internal lines will be detected only for the selected piece. If you didn't select any piece, the internal lines will be automatically detected on all detected pieces.

If there is only one internal line on the piece, this one will be detected as grain axis. If there are many internal lines on the piece, the longer one will be detected as grain axis.

Select the piece with a mouse click inside its contour. The selected piece must have red contour.	Make click on "Detect internal line for the selected piece" from button bar or select the option "Detect internal line" from "Modify/Internal Lines" menu.	The internal line will appear inside piece contour. If there are many internal lines on the piece, the longer one will be detected as grain axis.

You can set the visibility level for detected internal lines. The track bar position for inner lines visibility from "Interpretation settings" will be initial position of points visibility track bar from main window of Gemini Photo Digitizer.

The users have the possibility to adjust and follow in real time the visibility level of internal lines.

For the patterns that contain lines, points or spots that shouldn't be found on the surface of the pattern can be used three track bars for visibility set. To see the visibility track bars on main window right panel you must assure that you have no internal element or notch selected. To adjust and follow in real time the visibility level of internal lines you must click and keep pressed the left mouse button while you drag from track bar cursor.

The maximum left position will allow detecting as internal lines only the best marks for inner lines from patterns.

The maximum right position will allow detecting as internal lines all the marks from patterns which appears as inner lines.

To check if internal lines were detected you can use "Play Internal lines" function. This function will allow you to move on internal lines from begin point to end point. To access "Play Internal Lines" function you must click on the extension of Play button on button bar. Will be displayed a list of play functions. From this list, you must select "Play Internal Lines". You can move from line to line using the mouse wheel or the mouse buttons.

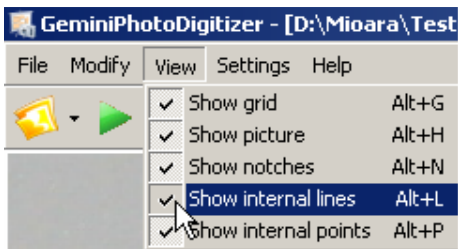
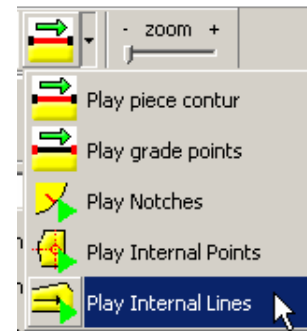
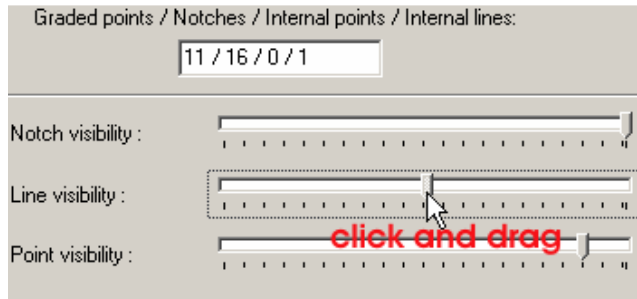
The played point of internal line will be marked with a red rectangle.

When you are in play mode all the other function are disable. To go out from play mode you must click again on Play button from application button bar. Besides, you can use ESC key from keyboard to go out from this mode.

The user has also the possibility to display or to hide the internal lines from detected pieces.

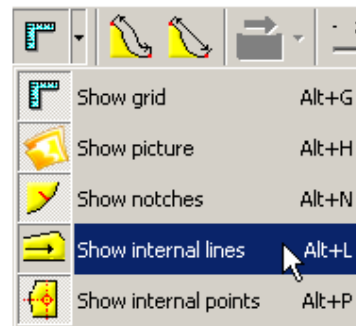
While using "Play Internal Lines" function you can delete the displayed line.

In order to do this you must press DELETE button from keyboard. Automatically will be displayed next line detected inside piece contour.



hidden.

To display or to hide the internal lines on detected pieces you can use the option "Show internal lines" from "View" menu. If in View menu, this option is checked, than the internal lines will be displayed. If not, the internal lines will be



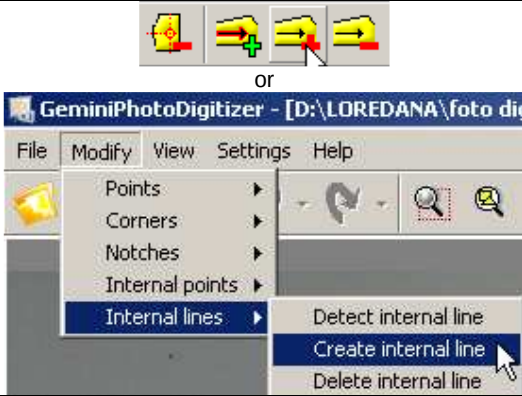
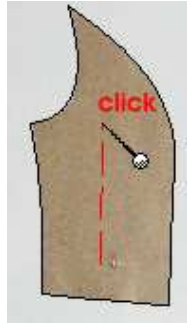
Besides, you can click on "Show internal lines" button. This button can be accessed from the menu, that appear when you make click on the "Show grid" button extension.

11.2 Add new internal line. Delete internal line.

To add a new internal line click on "Modify" menu and select "Internal lines / Create internal line" option "and then click in the point where you want to set the start for the internal line; then click on the point where ends the internal line. Both points must be inside the piece contour. Besides, you can use "Create internal line" button from button bar to create an internal line.

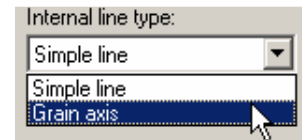
After you have created the internal line, you will be able to set its type: grain axis or simple internal line.

To add many internal lines you must keep pressed SHIFT key when you select "Create internal lines" function (from menu or from button bar). If you want to finish adding internal lines, you must press ESC key from keyboard or you can click again on "Create internal line" function.

 or Select "Create internal line" option from "Modify / Internal lines" menu Or click on "Create internal line" button. Press SHIFT key when you select "Create internal line" option to add many internal lines.	 Click on the piece in the point where you want to set the start for the internal line.	 Click on the point where ends the internal line.
--	--	---

To set the type of the internal line you must select the line first, and you must select its type in Properties area from the right side of your screen.

You cannot have two grain axis on the same piece. If you already have a grain axis on a piece and you set on another line this property, the last one will become the grain axis. The first grain axis will automatically become a simple internal line.



While you draw the internal line hold down CTRL key; the line will be perfectly horizontal, vertical or on 15, 30, 45, 60, 75, 90 degrees angles related to the X and Y axis.

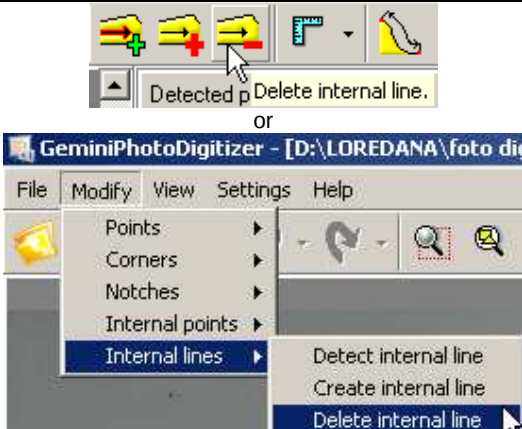
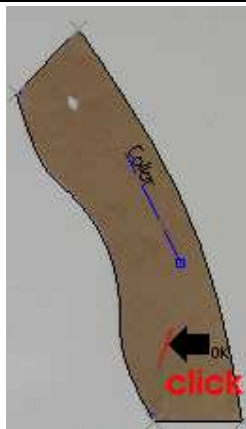
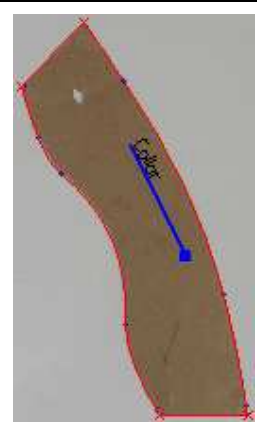
Hold down

CTRL

while you draw the internal line in order to obtain a precise angle related to system coordinates

To delete a internal line: click on « Modify » menu and select "Internal lines / Delete internal line" option and select the line that must be deleted. Besides, you can use "Delete internal line" button from button bar and then click on the line that must be deleted.

To delete many internal lines you must keep pressed SHIFT key when you select "Delete internal line" function (from menu or from button bar). If you want to finish deleting lines, you must press ESC key from keyboard or you can click again on "Delete internal line" function.

 or Select "Delete internal line" option from "Modify / Internal lines" menu Or click on "Delete internal line" button. Press SHIFT key when you select "Delete internal line" option to delete many internal lines.	 Select the internal line to be deleted	 The internal line was deleted.
---	--	---

You can delete an internal line even while you are using "Play Internal Lines" function. If you press DELETE button from keyboard the displayed internal line will be deleted and automatically will be displayed next internal line.

To delete all internal lines unless the selected one you must press SHIFT+DELETE keys in same time.

If you hold down **SHIFT** when you select "Create internal line" or "Delete internal line" function (from button bar or from top menu) you will create or will delete many internal lines. Press ESC key to go out from this mode.

Hold down

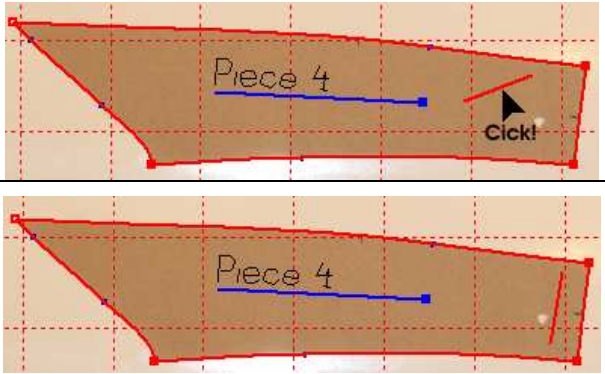
SHIFT

when you select "Create internal line" or "Delete internal line" to create or to delete many internal lines.

11.3 Internal line properties

You can give precise coordinates for the line position. The X and Y coordinates are related to the piece origin point. For this, when the line is selected, in the right side, under the Internal line type you have the line properties. Here you can set the line starting point position, the line inclination and its length.

For the grain axes you can change very easy the origin point just by clicking on Flip button from the right panel.

	Internal line type: Grain axis Properties: X = -3.19 cm Y = -8.72 cm Angle: 183 cm Length: 9.75 cm Apply Flip
Select the line to display its properties in the right side of the screen.	When the line is selected, you can see its properties and change them if necessary. After each change click on "Apply" button or press Enter.

You can change a line position and dimension freely by mouse drag. If you want just to move it, make a click on the line, then keep left mouse button pressed and then drag the mouse till the line has the desired position.

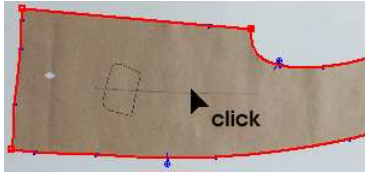
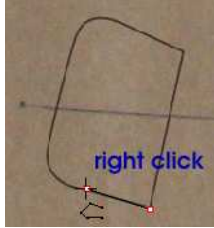
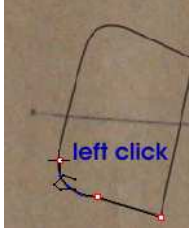
If you want to move it points, make a click on an edge point and drag it with left mouse button pressed. In this way you will change the point coordinates and the inclination angle.

12. Auxiliary pieces

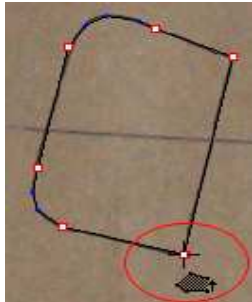
12.1 How to add an auxiliary draw

Auxiliary patterns are used as signs to indicate how will be combined different parts of the garment or to create new patterns. In Gemini Photo Digitizer, an auxiliary draw is al the time linked by a main pattern. To draw an auxiliary pattern you must select first the main pattern on which you need to add it. After selecting the main pattern you must press "Add auxiliary piece" to be able to start drawing the auxiliary piece. For a better precision on drawing especially when you follow a contour from the picture you can watch the magnifier. The magnifier shows you in real time on a bigger scale the area in which you made click.

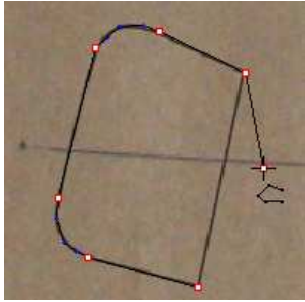
An auxiliary draw can be edited exactly as any pattern contour. You can interpolate it, you can add or delete points, you can set the points properties, and you can convert lines into curves and curves into lines (see chapters 8.2, 8.3, 8.4).

			
To add an auxiliary piece you must select the piece on which you want to draw it. To select a piece you must click inside it. The contour of the selected piece will become red.	After selecting the piece, the button "Add auxiliary piece" become enable. You must click on this button to start drawing the piece.	To draw you must make click were you need to add points of the auxiliary piece. To add grading points you must make click on the right mouse button. The first and the last drawn points are by default graded points even if you used left mouse button to add them.	To add curve points you must make click on the left mouse button. The added curved points will be linked by straight lines. To obtain curves on auxiliary piece contour you must interpolate it.

Finish drawing by auxiliary piece contour closure:

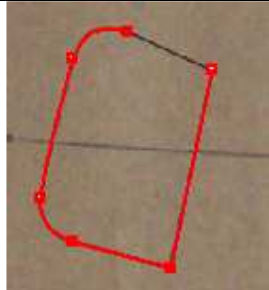
	Auxiliary pieces: Finish Close piece click Open piece Interpolate	
If you want to finish drawing by piece contour closure; you can continue the drawing to reach again the first point; when the cursor overlaps the first point, near it appears the perimeter closure symbol ; click on the first point to close the piece.	To close the piece contour you can stop before overlapping the first point and you can press "Close piece" option from right menu. The last drawn point will be linked with a straight line.	The piece contour will be closed

Finish drawing without closing the auxiliary piece contour:

	Auxiliary pieces: Finish  Close piece click Open piece Interpolate	
If you want to finish drawing without auxiliary piece contour closure you must insert the last point before click on "Finish" option from the right menu.	In the right menu click on "Finish" button.	The piece contour will remain opened.

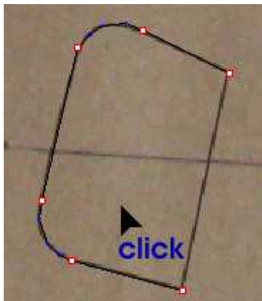
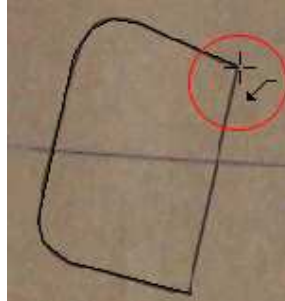
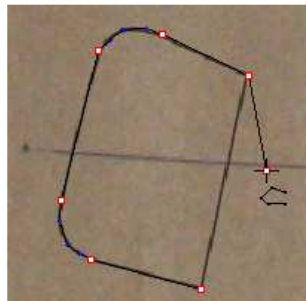
12.2 How to open the contour of a closed auxiliary piece

An auxiliary piece with a closed contour can be opened by deleting a segment. First you must select the piece contour segment that must be removed, then click on « Open piece » button from the right menu. The piece contour will automatically open.

	Auxiliary pieces: Finish Close piece Open piece  Interpolate click	
To open an auxiliary piece contour you must select the piece segment that will be removed.	Press the "Open piece" button from right menu.	The last drawn line will be automatically removed and the piece contour will become open.

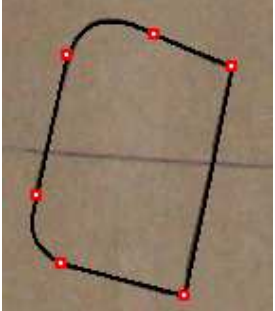
12.3 Continue to draw an auxiliary piece

An auxiliary piece with an open contour can be continued by drawing new points and lines. First you must select the auxiliary piece (click to select the incomplete piece), then click on « Add auxiliary piece » button then click on one of the ends of the piece contour; the drawing will continue as previously described.

			
To continue drawing an auxiliary piece with an open contour you must select the main piece on which is attached the auxiliary piece.	Press the "Add auxiliary piece" button from button bar.	Move the cursor over a contour end. Click on the end point.	Continue drawing the piece, as previously described.

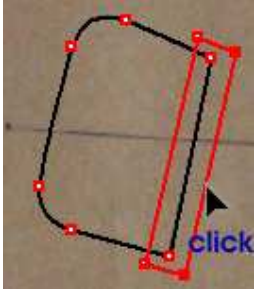
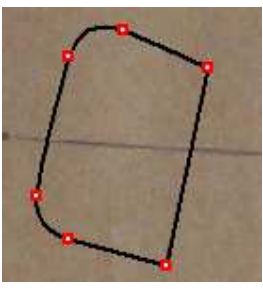
12.4 How to interpolate an auxiliary piece

After drawing, the auxiliary piece contour is formed by points joined by lines. Even the curved regions are approximated by a bundle of straight lines reproducing the curve shape. To transform these imperfect curves (formed by segments) into perfectly smoothed curves called Bezier curves is necessary to interpolate the auxiliary piece. These Bezier curves can be easily modified to correct or change the pattern shape and insures a higher quality reproduction of the curved shapes. To interpolate a piece you must select it first than click on "Interpolate" s button from the right menu.

	Auxiliary pieces: Finish Close piece Open piece Interpolate click	
Click on the auxiliary piece contour to select it.	Press the "Interpolate" button from right menu.	By interpolation, the intermediate curve points disappear and the curves become smoothed and precise.

12.5 How to delete an auxiliary draw

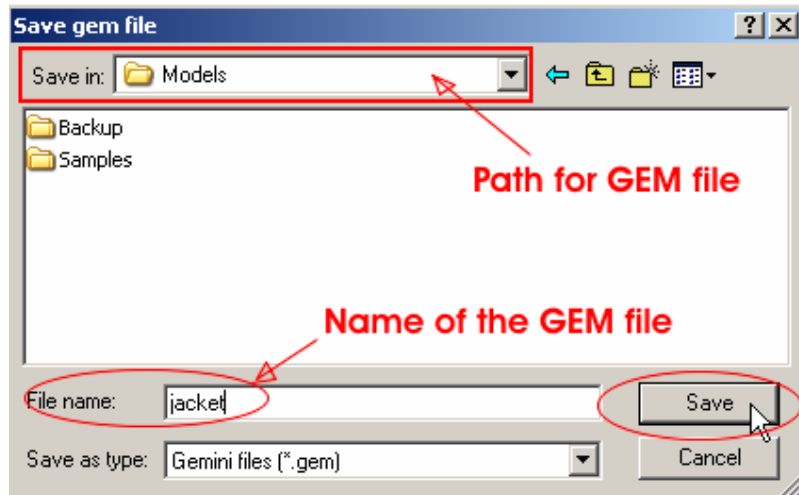
To delete an auxiliary draw you must selected it first than the button "Remove auxiliary piece" will become enable. After you will press this button the auxiliary piece will be removed.

		
Select the auxiliary draw by clicking on it.	Press the "Remove auxiliary piece" button.	The auxiliary draw will be deleted

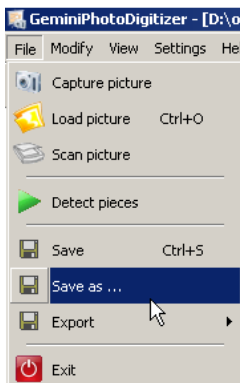
13. How to save detected patterns

13.1 Saving in GEM (Gemini) file

When you finish detecting the pieces and periodically during working process you must save changes by clicking on the « Save » button. To save you can use also the "Save" option from "File" menu. You will create a GEM file that can be loaded in Gemini Pattern Editor.



At the first time save, you must enter the project name; on further saving the program will save changes in the same file.

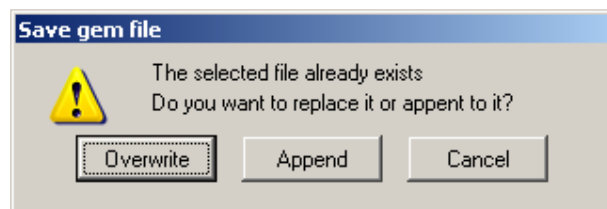


In the window "Save pat file", the user must select the path for saving and the name of file. If you are working in demo mode, on file name will appear automatically the extension "demo_".

To save the pieces in a file with a different name you must click on « Save as... » option from "File" menu. In the window that appears you must enter the new file name and click on « Save » button.

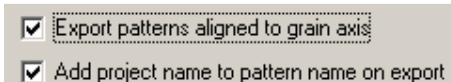
If you need to save the detected pieces in a model already created (saved before), than after pressing "Save" or "Save as" you must select the model in which you want to save and press "Save" button. Will appear a small window in which you must press "Append" button if you want to save the detected pieces in the selected model with the other pieces. If you will press "Overwrite" button you will create a new model which contain only the last saved pieces.

If you will press "Cancel" button you will cancel the saving.



To save all patterns aligned to grain axis you must check "Export patterns aligned to grain axis" option from Gemini Photo Digitizer settings, Export tab.

In mentioned tab the user can set to save on each pattern its name and the project name. In order to do this he must check "Add project name to pattern name on export" in Gemini Photo Digitizer settings, Export tab.

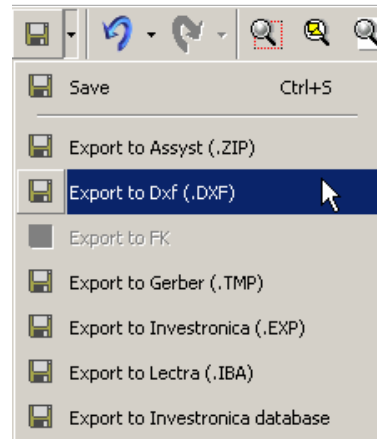


13.2 Saving in DXF file

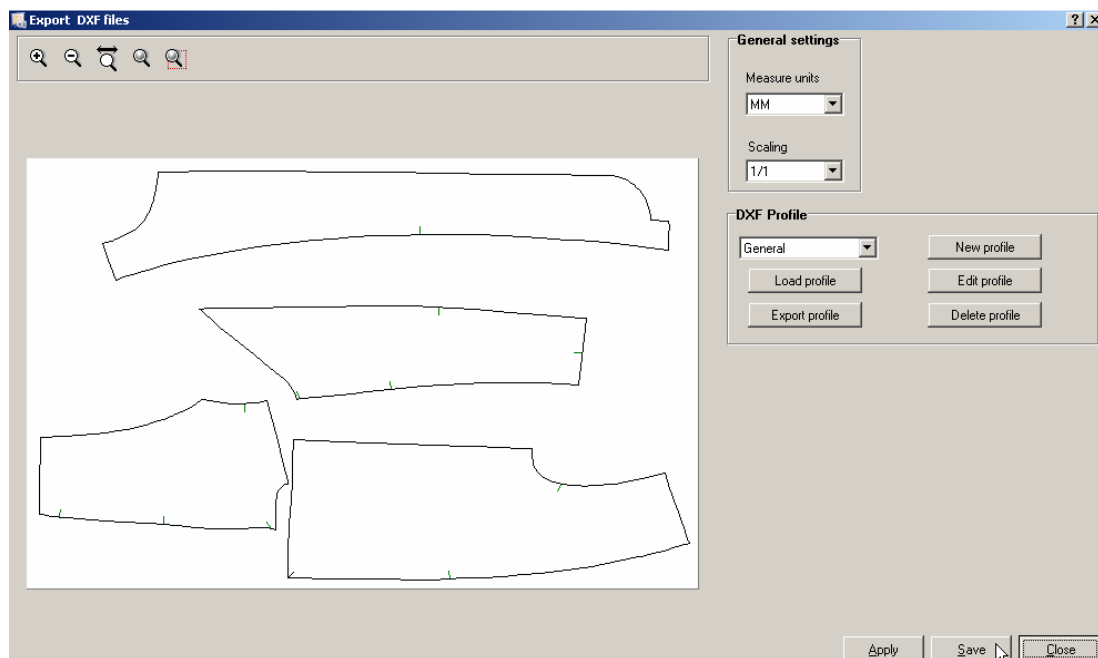
Gemini Photo Digitizer program can export files in standard formats as DXF, in DXF format for INVESTRONICA, LECTRA, GERBER, ASSYST...

DXF files (Data Exchange files) are used for patterns only and contain pieces.

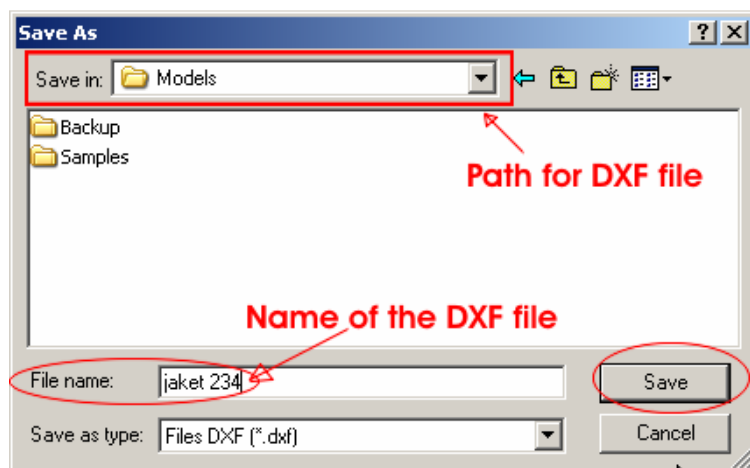
To export a file in DXF format, open the « File » menu and then the « Export » submenu. From the list that appears, select “Export to DXF” option and the export window will open. You can export DXF by using “Export to DXF” button from button bar. To access “Export to DXF” function you must click on the extension of “Save” button from button bar. Will be displayed a list of export types. From this list, you must select “Export to DXF”.



The export window contains a preview area for the exported file and some options for the format and content of the exported file.



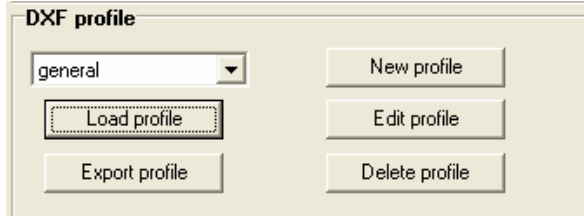
To save you must select the correct profile and you have to press “Save” button. In the window that appears, you must set the path and the name of the DXF file and press “Save” button.



General settings for export

You must select the export measurement unit and the scaling factor for the quote.

DXF file profiles



There are many DXF file types according to the CAD system that generates the file or depending on the user settings during the export step. While these files are destined to be loaded also on other CAD systems, Gemini software allows to define a specific profile for such a file. To define the profile of a DXF file, you must define the general settings, the structure settings and the layer settings for a specific file.

There are seven predefined DXF file profiles, called standard profiles. These profiles are specific for files that will be imported in CAD systems as: Lectra, Investronica, Assyst, Gerber, NovoCut, Optitex. There is a specific profile called General. This profile is used to export files for CAD systems that do not have a predefined profile.

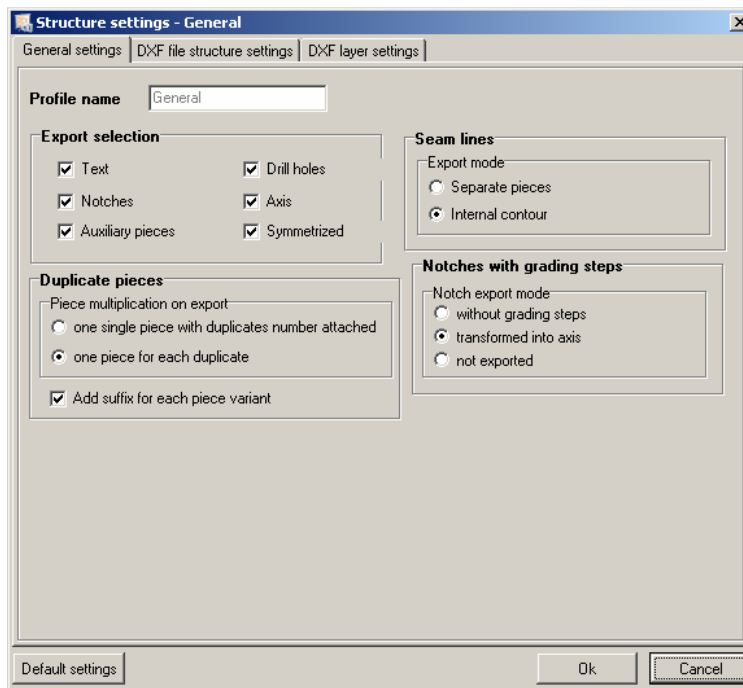
To load a profile you must click the « Load profile button »; in the opened window you must choose the path and you must select the profile; then you must click the « Open » button. The loaded profile name appears in the « Profile: » field and is added to the preexistent profiles list.

A standard profile can be modified if you click on the « Edit profile » button.

To delete a profile on a list you must select the profile and click on « Delete profile » button. A standard profile cannot be deleted.

A profile in a list can be modified if you click on « Edit profile » button. To create a new profile you must click on « New profile » button.

The opened form « Structure settings » includes three windows: « General settings », « DXF file structure settings » and « DXF layer settings ».



In « **General settings** » window you must type the profile name, you must define the elements to be exported, the way the pieces will be multiplied on export and the how the seam lines will be exported

On **Export selection** you must check the elements to be exported in the DXF file (text, notches, auxiliary pieces, drill holes, symmetry axes).

Duplicate pieces settings

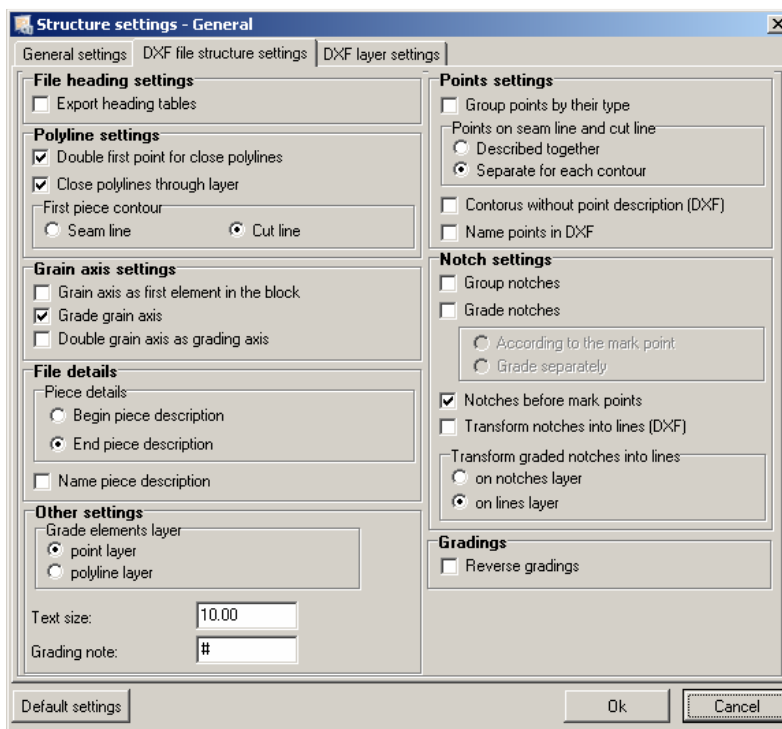
For the piece multiplication you must check the message « one single piece with duplicates number attached » if you want to get a single piece with the indicated number of copies. Alternatively, you must check near the message « one piece for each duplicate » if the file will contain one piece for each copy.

Export seam lines

To define the seam the seam contour you must check the message « Define seam contour » and then choose the defining mode.

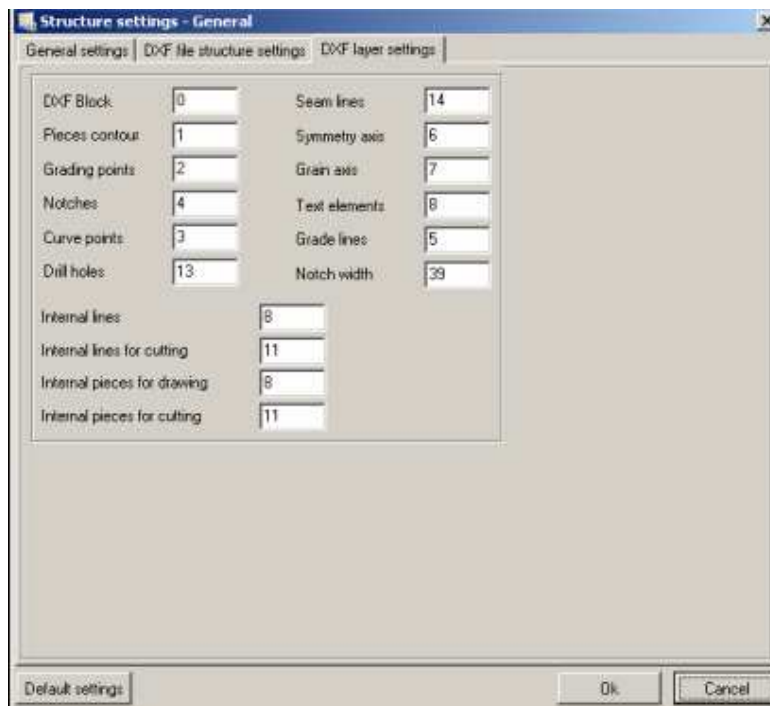
If you check « Separate pieces » the seam line and the cut line will be defined as two separate pieces.

If you check « Internal contour » the seam line will be defined as an auxiliary piece inside the piece designed on the cut line.



In « **DXF file structure settings** » the user must define the settings related to the file header, the polygonal lines design, and file info.

You have also to define settings for points, notches, grain axis and other settings related to the grading elements layer.



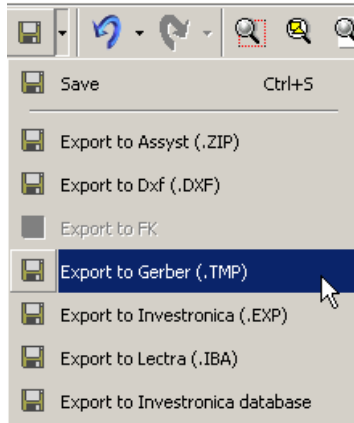
In « **DXF layer settings** » you can edit the layer number on which you can define a specific element. The layer number for each exported element must be inserted according to the system in which you will load the file.

To export all patterns aligned to grain axis you must check “Export patterns aligned to grain axis” option from Gemini Photo Digitizer settings, Export tab.

In mentioned tab the user can set to export on each pattern its name and the project name. In order to do this he must check “Add project name to pattern name on export” in Gemini Photo Digitizer settings, Export tab.

- ☒ Export patterns aligned to grain axis
- ☒ Add project name to pattern name on export

13.3 Saving in TMP (Gerber) file

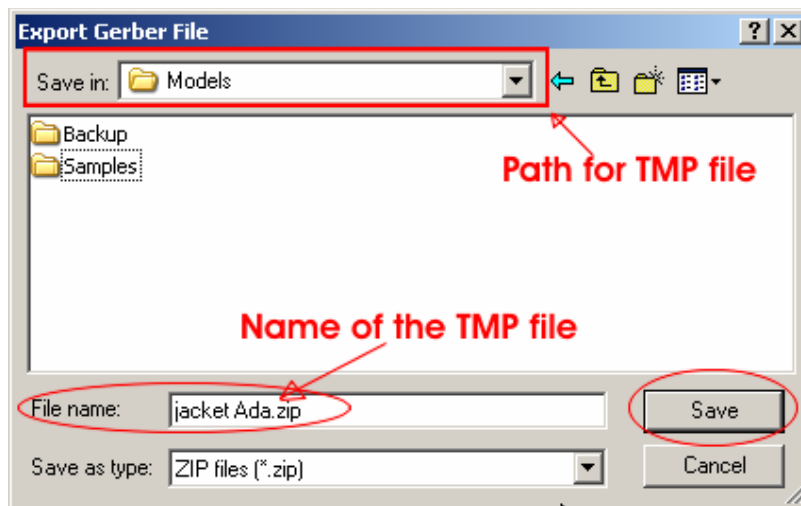


To save the pieces in a TMP file format you must select the option "Export / Export to Gerber (.TMP)" from "File" menu. Or you just have to click on "Export to Gerber (.TMP)" button from button bar. This button can be found in the list which appears when you make click on the extension of "Save" button.

The TMP file is a Gerber native format used only for patterns.

The TMP file will contain the pieces contours, the notches, the internal lines, the internal points and the auxiliary drawings. The TMP files will be exported in a ZIP archive.

In the window that appear when you accessed the "Export to Gerber(.TMP)" option, the user must set the path for saving and the name of the archive.

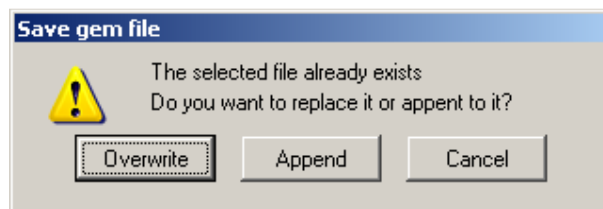


After you done all this settings just press "Save" button to save a TMP file in a ZIP archive on disk.

If you consider necessary you can change the interpolation precision and the graded point angle. You can change this parameter in "Export settings" tab from "Settings Gemini Photo Digitizer".

If you need to save the detected pieces in a ZIP archive with TMP files already created (saved before), than after pressing "Export/Export to Gerber (TMP)" you must select the ZIP archive in which you want to export and press "Save" button. Will appear a small window in which you must press "Append" button if you want to save the detected pieces in the selected archive with other pieces. If you will press "Overwrite" button you will create a new ZIP archive which contain only the last exported pieces.

If you will press "Cancel" button you will cancel the export.



Settings Gemini Photo Digitizer

General settings | Camera settings / Calibration | Interpretation settings | Interface settings | **Export settings**

Investronica settings:

IP:

User:

Password:

☐ Remote files path:

Interpolation Precision : cm

Gerber settings:

Polyline Precision : cm

Lectra settings:

Interpolation Precision : cm

Graded point angle :

☒ Export patterns aligned to grain axis

☒ Add project name to pattern name on export

If you will introduce smaller value for interpolation precision the exported pieces will have many curve points on the contour.

If you will introduce bigger value for interpolation precision the exported pieces will have less curve points on the contour.

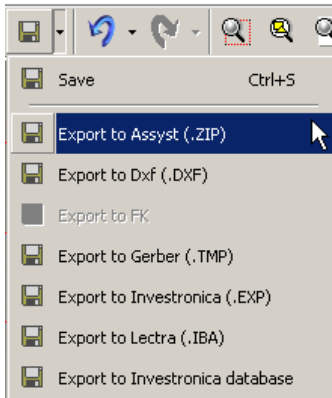
To export all patterns aligned to grain axis you must check "Export patterns aligned to grain axis" option from Gemini Photo Digitizer settings, Export tab.

In mentioned tab the user can set to export on each pattern its name and the project name. In order to do this he must check "Add project name to pattern name on export" in Gemini Photo Digitizer settings, Export tab.

☒ Export patterns aligned to grain axis

☒ Add project name to pattern name on export

13.4 Saving in ZIP (Assyst) file



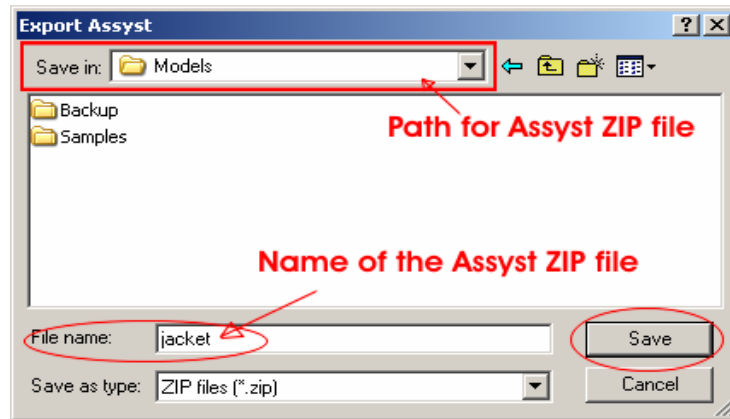
To save the pieces in a Assyst ZIP file format you must select the option "Export / Export to Assyst (.ZIP)" from "File" menu. Or you just have to click on "Export to Assyst (.ZIP)" button from button bar. This button can be found in the list which appear when you make click on the extension of "Save" button.

The ZIP file is a Assyst native format used only for patterns.

This file will contain the pieces contours, the notches, the internal lines, the internal points and the auxiliary drawings.

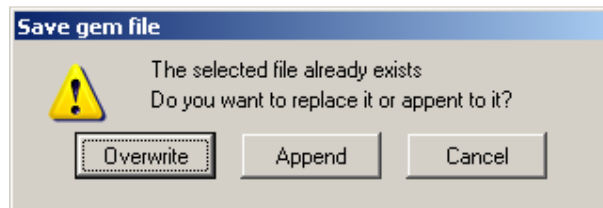
In the window that appear when you accessed the "Export to Assyst (.ZIP)" function the user must set the path for saving and the name of the archive.

After you done all this settings just press "Save" button to save a Assyst ZIP archive on disk.



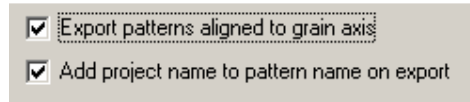
If you need to save the detected pieces in a ZIP archive for Assyst already created (saved before), than after pressing "Export/Export to Assyst (ZIP)" you must select the ZIP archive in which you want to export and press "Save" button. Will appear a small window in which you must press "Append" button if you want to save the detected pieces in the selected archive with other pieces. If you will press "Overwrite" button you will create a new ZIP archive which contain only the last exported pieces.

If you will press "Cancel" button you will cancel the export.

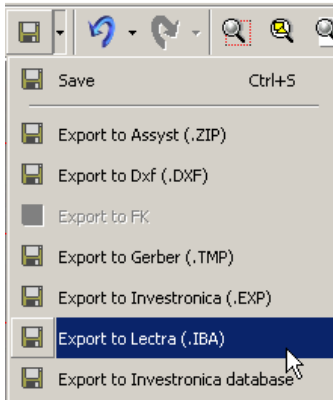


To export all patterns aligned to grain axis you must check "Export patterns aligned to grain axis" option from Gemini Photo Digitizer settings, Export tab.

In mentioned tab the user can set to export on each pattern its name and the project name. In order to do this he must check "Add project name to pattern name on export" in Gemini Photo Digitizer settings, Export tab.



13.5 Saving in IBA (Lectra) file

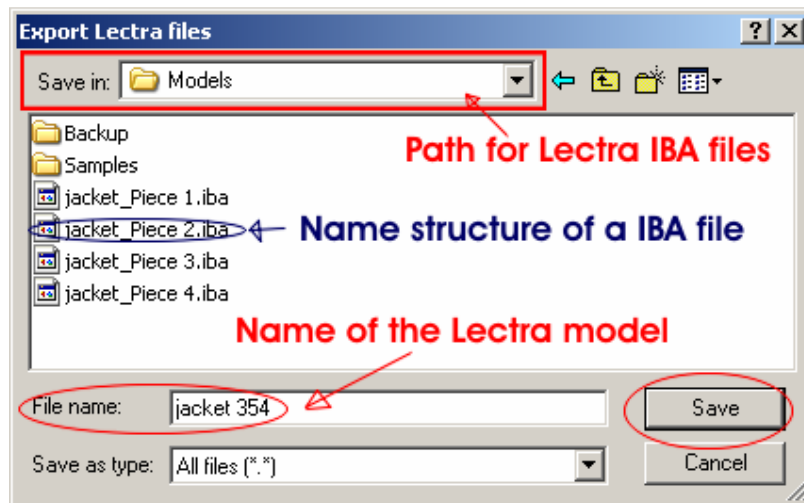


To save the pieces in a IBA file format you must select the option "Export / Export to Lectra (.IBA)" from "File" menu. Or you just have to click on "Export to Lectra (.IBA)" button from button bar. This button can be found in the list which appears when you make click on the extension of "Save" button.

The IBA file is a Lectra native format used only for patterns.

This file will contain only one piece (the piece contour, the notches, the internal lines, the internal points and the auxiliary drawings).

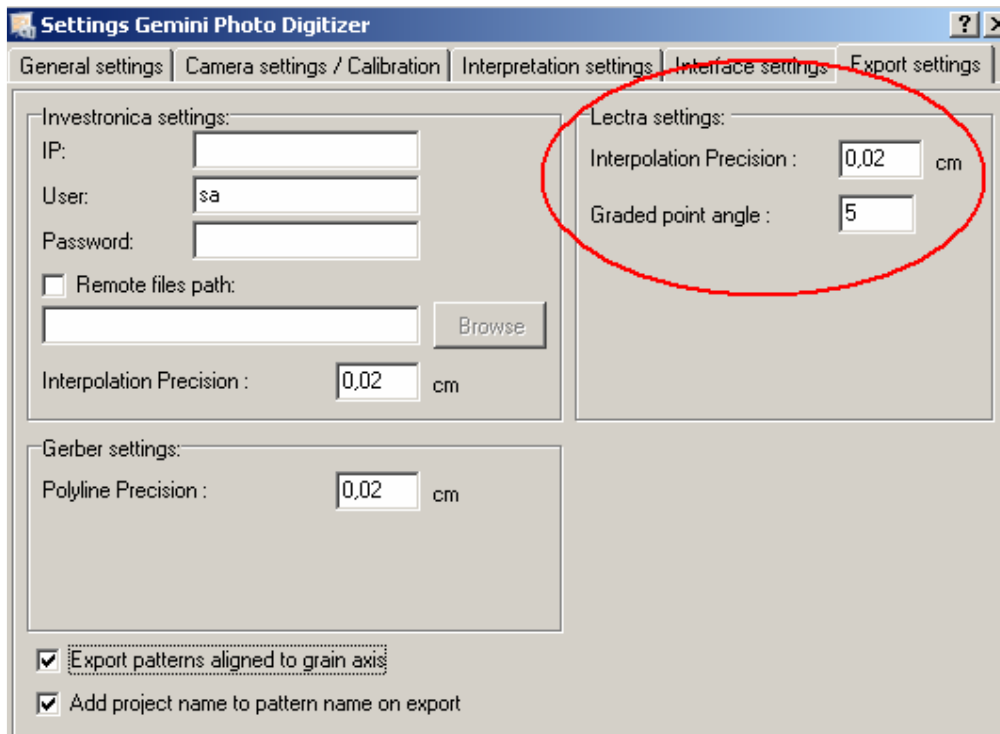
In the window that appear when you accessed the "Export to Lectra (.IBA)" function the user must set the path for saving and the name of the archive.



After you done all this settings just press "Save" button to save IBA on disk.

Because an IBA file can contain only one piece, when saving many pieces you will introduce on "File name" the model name. After pressing "Save" button you will obtain on disk as many IBA files as many pieces you have exported. The name of IBA files will be composed by model name and piece name in this format : "model name_piece name.iba".

If you consider necessary you can change the interpolation precision and the graded point angle. You can change this parameter in "Export settings" tab from "Settings Gemini Photo Digitizer".



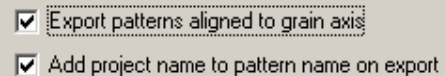
If you will introduce smaller value for interpolation precision the exported pieces will have many curve points on the contour.

If you will introduce bigger value for interpolation precision the exported pieces will have less curve points on the contour.

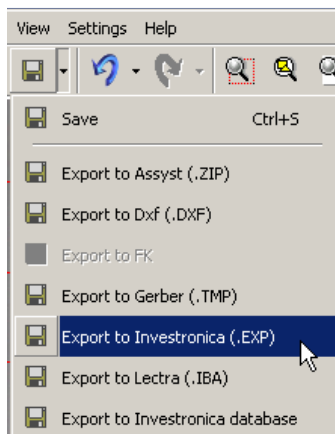
If the angle of a curve point, has bigger deviations from smooth than "Graded point angle" value than these points will be exported as graded point.

To export all patterns aligned to grain axis you must check "Export patterns aligned to grain axis" option from Gemini Photo Digitizer settings, Export tab.

In mentioned tab the user can set to export on each pattern its name and the project name. In order to do this he must check "Add project name to pattern name on export" in Gemini Photo Digitizer settings, Export tab.



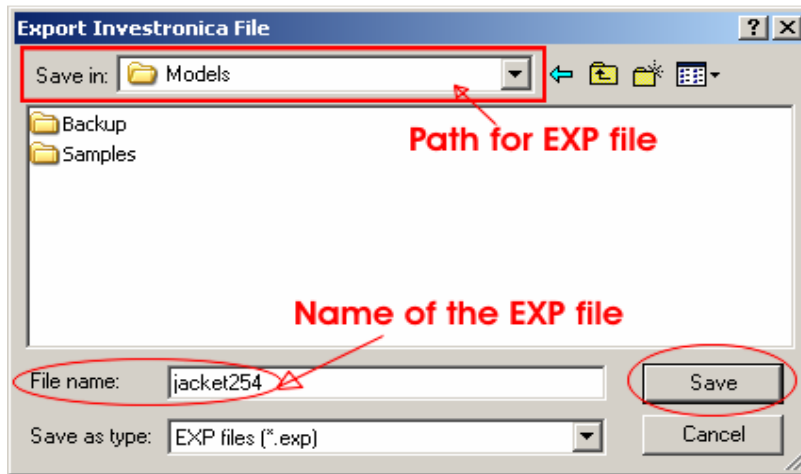
13.6 Saving in EXP (Investronica) file



To save the pieces in Investronica EXP file format you must select the option "Export / Export to Investronica (.EXP)" from "File" menu. Or you just have to click on "Export to Investronica (.EXP)" button from button bar. This button can be found in the list which appear when you make click on the extension of "Save" button.

The EXP file is a Investronica native format used only for patterns.

This file will contain the pieces contours, the notches, the internal lines, the internal points and the auxiliary drawings.



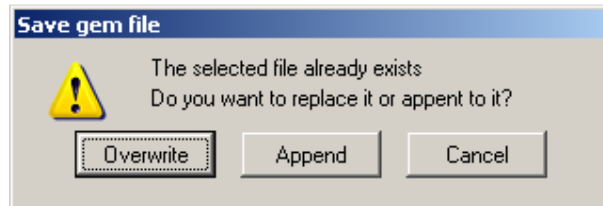
In the window that appear when you accessed the "Export to Investronica (.EXP)" function the user must set the path for saving and the name of the archive.

After you done all this settings just press "Save" button to save an Investronica EXP file on disk. The pieces from EXP file will take automatically the name of the EXP as prefix on the piece name. This will help a lot when you

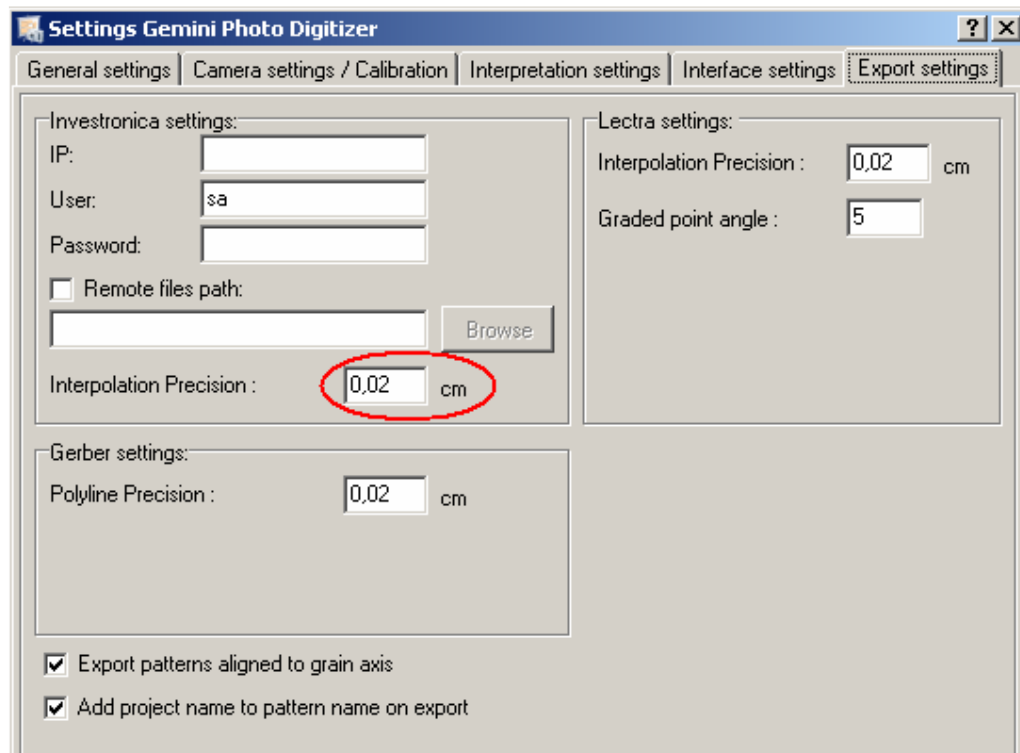
load the pieces in Investronica.

If you need to save the detected pieces in a EXP file already created (saved before), than after pressing "Export/Export to Investronica (EXP)" you must select the EXP file in which you want to export and press "Save" button. Will appear a small window in which you must press "Append" button if you want to save the detected pieces in the selected file with other pieces. If you will press "Overwrite" button you will create a new EXP file which contain only the last exported pieces.

If you will press "Cancel" button you will cancel the export.



If you consider necessary you can change the interpolation precision. You can change this parameter in "Export settings" tab from "Settings Gemini Photo Digitizer".



If you will introduce smaller value for interpolation precision the exported pieces will have many curve points on the contour.

If you will introduce bigger value for interpolation precision the exported pieces will have less curve points on the contour.

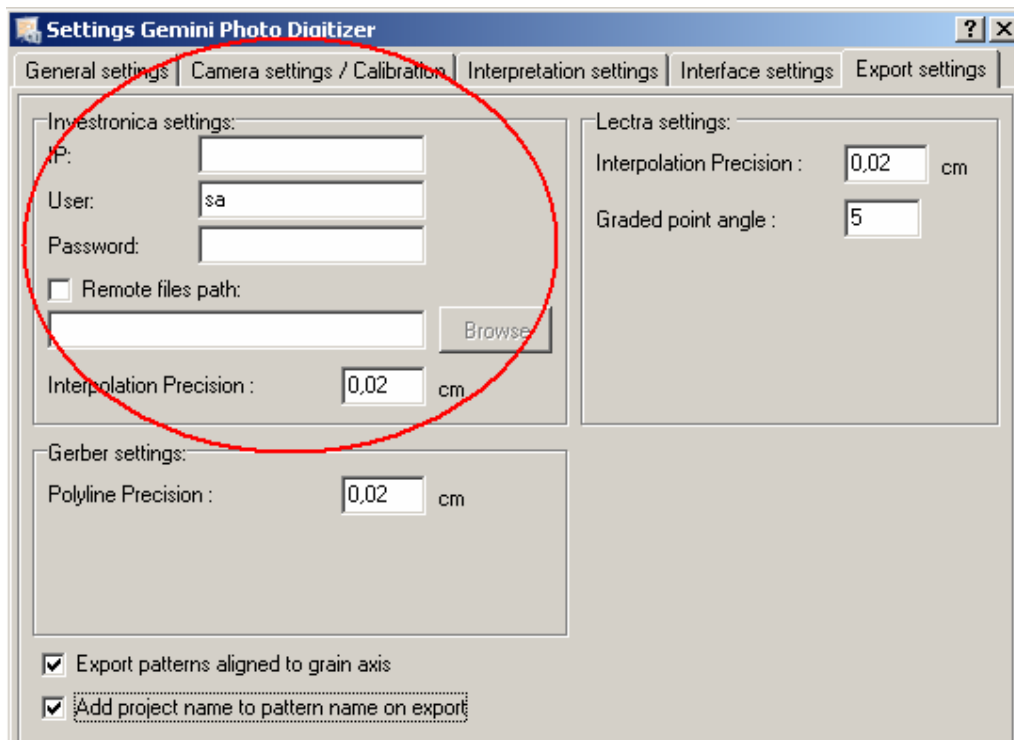
To export all patterns aligned to grain axis you must check "Export patterns aligned to grain axis" option from Gemini Photo Digitizer settings, Export tab.

In mentioned tab the user can set to export on each pattern its name and the project name. In order to do this he must check "Add project name to pattern name on export" in Gemini Photo Digitizer settings, Export tab.

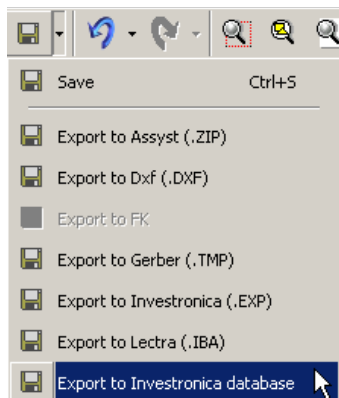
- ☒ Export patterns aligned to grain axis
- ☒ Add project name to pattern name on export

13.7 Saving in Investronica Data Base

You can export the detected pieces directly in Investronica database. For this is very important to make the right settings in "Export settings" tab from "Settings Gemini Photo Digitizer" window. In this window, you must introduce the correct Investronica IP server and the name of the user. If in Investronica it is set a password for the user, you must introduce also the password in this window. If the data base is on the same computer and if you have no connection to a network, the IP field must remain empty.

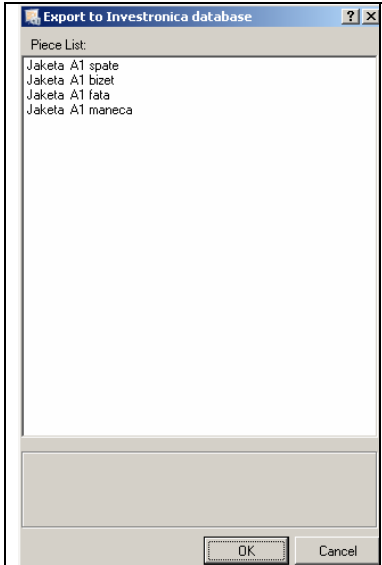
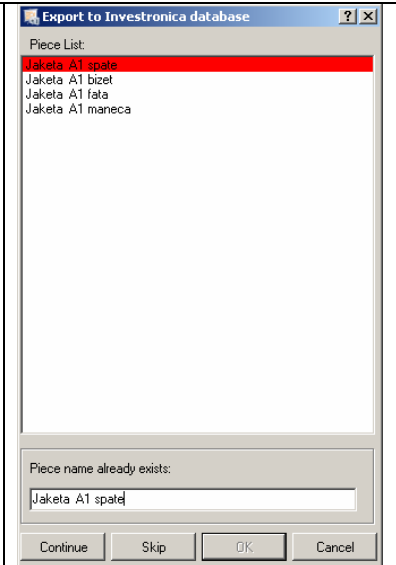


If you must export in Investronica database on a different computer connected to the net, you can remote the files path. For this, you must check the message "Remote the files path" and you have to select the new path using the Browse button.



To save the pieces in Investronica database you must select the option "Export / Export to Investronica database)" from "File" menu. Or you just have to click on "Export to Investronica database" button from button bar. This button can be found in the list which appears when you make click on the extension of "Save" button.

In the window that appear when you accessed the “Export to Investronica database “ function the user will see a list of the pieces that will be exported. To export the pieces on Investronica database you must press “OK” button. The exported pieces will appear on a green background in the list. If the name of the exported piece already exists in Investronica database, the user must change the piece name. the name that already exist in Investronica database will be marked with a red background.

 The list of the pieces that will be exported directly on Investronica database	 The pieces from green background were exported in Investronica database.	 The piece name from red background already exists in Investronica database.
---	---	---

For the pieces names that already exist in Investronica database there are two possibilities:

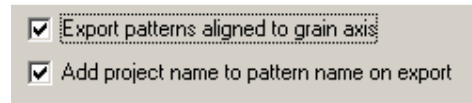
- to change the piece name and press “Continue” button to export it
- to press “Skip” button – the marked piece will not be exported in Investronica database

If you will not change the name hat already exist in database you will not be able to export that piece.

To load in Investronica very easy the exported pieces it is recommended to use a common prefix on piece names for the exported pieces.

To export all patterns aligned to grain axis you must check “Export patterns aligned to grain axis” option from Gemini Photo Digitizer settings, Export tab.

In mentioned tab the user can set to export on each pattern its name and the project name. In order to do this he must check “Add project name to pattern name on export” in Gemini Photo Digitizer settings, Export tab.



14. Gemini Photo Digitizer settings

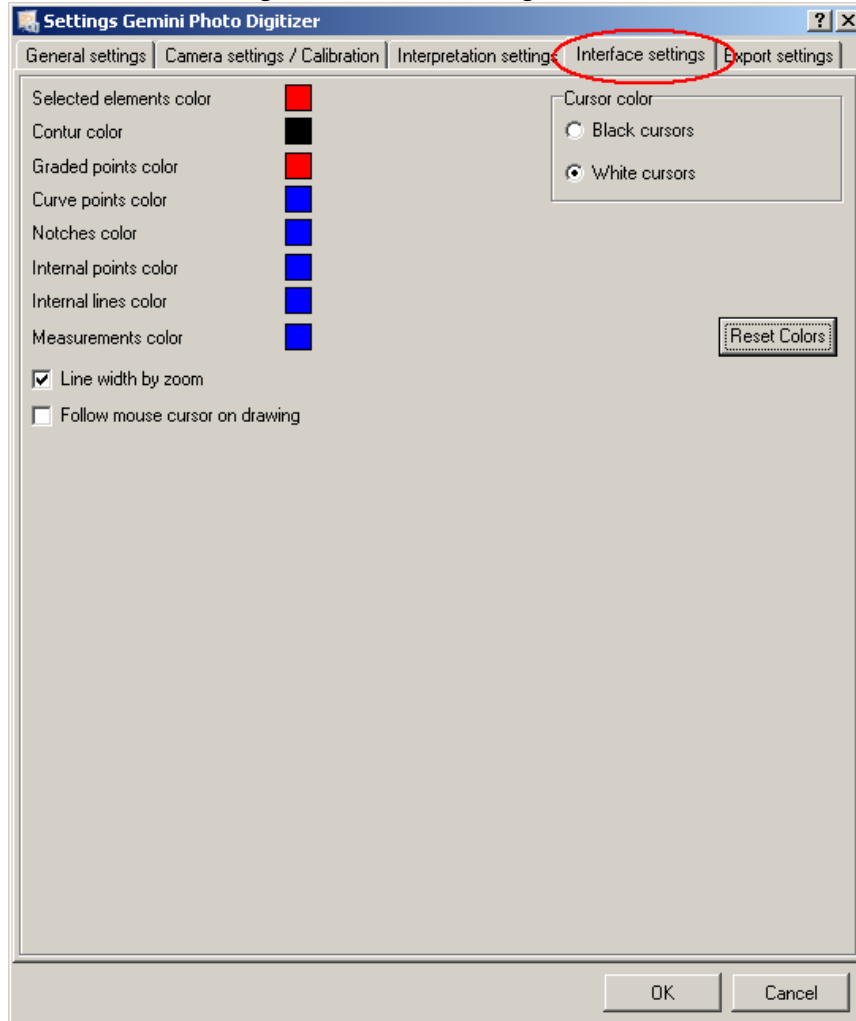
14.1 Gemini Photo Digitizer general settings

The screenshot shows the 'Settings Gemini Photo Digitizer' dialog box with the 'General settings' tab selected. The 'General settings' tab is circled in red. The dialog contains the following settings:

- Application language:** English (dropdown menu)
- Measurement unit:** cm (dropdown menu)
- Dimensions precision:** 2 (text input)
- Pictures directory:** d:\pictures\ (text input with a browse button)
- Save settings:**
 - ☒ Keep the images
 - ☐ Delete after capturing
 - ☐ Delete after 20 days (text input)
- Pictures name:**
 - ☒ Data&Time
 - ☐ Name & Index
- Name:** Picture (text input)
- Zoom level magnifier:** (slider)
- Zoom step:** (slider)
- ☐ Save only selected patterns
- Delete all pictures** (button)
- OK** and **Cancel** buttons at the bottom.

Application language	Here you can set the current language for the running application
Measurement unit	In the field near this message you can choose the measurement working units in Gemini Photo Digitizer application. You can choose from cm, mm or inch.
Dimensions precision	The number of decimals displayed for the quotes. We recommend that for measurement units as cm or inch to use maximum 2 decimals; if you choose the mm as measurement unit, we recommend the usage of a single decimal.
Pictures directory	By default the captured pictures will be saved in "D:\pictures" folder. Using Browse button you can change the picture saving path.
Save settings	Here can be set if the pictures will be kept, immediately deleted or deleted after a number of days. You can find a button, "Delete all pictures", that allows deleting all pictures from saving folder. By checking "Save only selected pieces" option, the saved file (.gem, .zip, .dxf, .tmp, .exp, .iba) will contain only the selected pieces. You can select more pieces from the "Stock area" holding the SHIFT key from keyboard.
Pictures name	You can set the name of the captured pictures. The name of the pictures can be the capturing date & time or can be a name and an index.
Zoom level magnifier	Here you can set the zoom level of magnifier area.
Zoom step	Here you can set the zoom step in "Conversion area" while using zoom in and out (with the scroll of mouse).

14.2 Gemini Photo Digitizer Interface Settings



In this window, the user can set the used colors for the captured pictures.

Selected elements color	Here you can set the color for selected elements.
Contour color	The color from here will be the color of the detected pieces contours
Graded points color	Here you can set the color for the graded points
Curve points color	Here you can set the color for the curve points
Notches color	Here you can set the color for the notches
Internal points color	Here you can set the color for the internal points
Internal lines color	Here you can set the color for the internal lines
Line width by zoom	By checking this option the contour of the piece and the points from piece contour (grading points and curve points) will be zoomed together with the rest of piece, else it will remain with its initial width.
Follow mouse cursor on drawing	By checking this option the zoom will be centered automatically where you make click while drawing auxiliary patterns.
Cursor color	Here you can set the cursor color : black or white.
Reset Colors button	This button will reset the colors for the elements from Interface settings. If you made some modifications on colors and you will press this button, you will go back to default colors.

PHOTO DIGITIZER

To check the piece contour:

Play piece contour button - use the wheel of the mouse or the mouse buttons to move along piece contour

For the notches:

CTRL + click on the notch - to select the notch

Keyboard left/right arrows - to move the selected notch by 1 cm

CTRL + Keyboard left/right arrows - to move the selected notch by 1 mm

Notch visibility track bar - change the position to set the visibility level for the notches detection

For the internal points:

Keyboard arrows - to move the selected internal point up-down, left-right by 1 cm

CTRL + keyboard arrows - to move the selected internal point up, down, left, right by 1 mm

Internal points visibility track bar - change the position to set the length for the detected internal points

For the internal lines:

Keyboard arrows - to move the selected internal line up-down, left-right by 1 cm

CTRL + keyboard arrows - to move the selected internal line up, down, left, right by 1 mm

Internal line visibility track bar - change its position to set the visibility level for the internal lines detection

To move a point from piece contour:

Keyboard arrows - to move the selected point up-down, left-right by 1 cm

CTRL + keyboard arrows - to move the selected point up-down, left-right by 1 mm

SHIFT + drag mouse - to display the point position in magnifier

To check or modify quickly the internal elements (notch, internal points and lines):

SHIFT + create/delete button - to create/delete a sequence of notches

SHIFT + DELETE - to delete all elements (notches, internal points or internal lines) unless the selected one

ESC - finish create/delete the sequence of notches, internal points or internal lines

Play button - use the wheel of the mouse or the mouse buttons to move from point to point or from notch to notch or from internal line to internal line

Delete Key while Play - delete the displayed element (notch, internal point or internal line), while it is used the Play function

To draw auxiliary pieces:

Left mouse button - to draw curve points

Right mouse button - to draw graded points

Keyboard arrows - to move the selected auxiliary piece up-down, left-right by 1 cm

CTRL + keyboard arrows - to move the selected auxiliary piece up-down, left-right by 1 mm

Short key combination for zoom:

F2 zoom in

F3 zoom out

F4 zoom to selected pieces

F5 zoom to the entire model

CTRL + F7 save the zoom level

F7 restore the saved zoom level

For the magnifier area:

"+" from Num Lock - increase the zoom level

"-" from the Num Lock - decrease the zoom level

Right mouse click pressed - shows you in the magnifier the actual position of the mouse even when you move it

For the conversion area:

Space + mouse dragging - keep pressed Space key to drag the image.

ALT - keep the key pressed to reduce substantially the mouse speed



16. Gemini X9 workstation - Hardware Specifications

To run Gemini X9 programs your computer should have the minimum hardware configuration described below. The Gemini X9 programs can run on computer with less performance hardware configuration than the minimum configurations, in this case the performance (speed) will be slower. For computers where the files made in Gemini X9 programs are complex (models with many pieces, cutting plans with many and long markers), we recommend a computer with higher hardware configuration than the minimum.

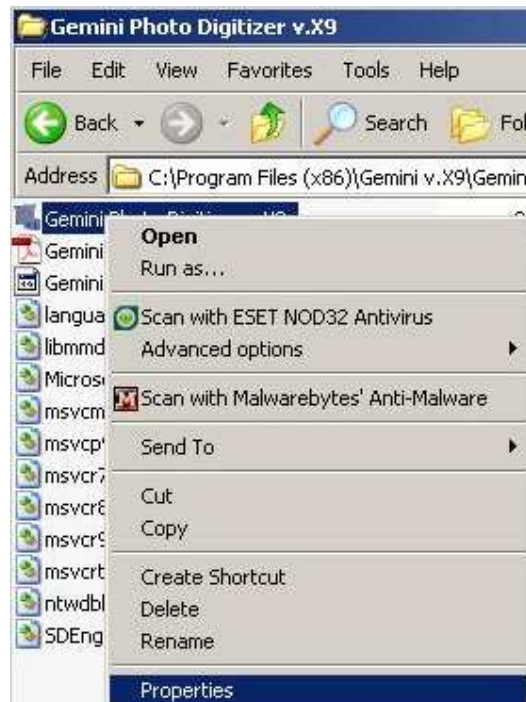
Minimum hardware configuration.

Application Hardware description	Gemini Pattern Editor X9	Gemini Cut Plan X9	Gemini Nest Expert X9	Gemini Photo Digitizer X9
Processor	P IV 1500 MHZ			
Free Disk Space	recommended: 1 GB			
RAM memory	minimum:512 MB, recommended: 1 GB			
Sound Card	Recommended For digitizing	not required	not required	not required
Ports for dongle – hardware protection key	USB port (2.0 or 3.0) for dongle			USB port (2.0 or 3.0) for dongle and for connection between camera and computer
Other ports	COM port (for digitizer)	not required	not required	not required
CD- ROM	For software installation			
Operating system	Windows XP* (SP2 or higher) Windows Vista** Windows 7****	Windows XP* (SP2 or higher) Windows Vista** Windows 7****	Windows XP* (SP2 or higher) Windows Vista** Windows 7****	Windows XP* (SP2 or higher) Windows Vista**, *** Windows 7****

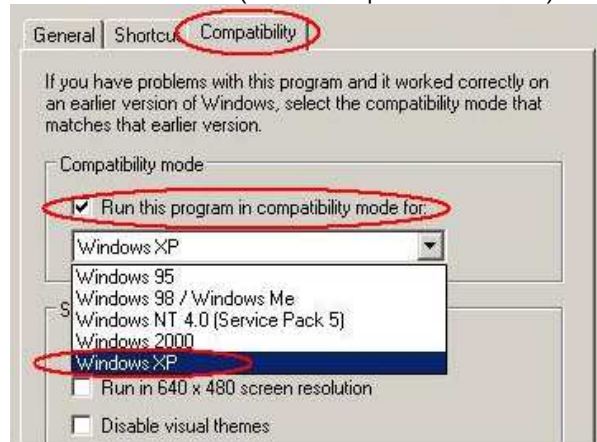
Notes:

* to run the Gemini v.X9 applications under Windows XP with 64 bits first the applications must be set with compatibility to an older Windows version. To do this, you have to follow the steps from below:

- click on the Shortcut or on the .exe file of a Gemini application (for ex. on *GeminiPhotoDigitizer v.X9.exe*)
- from the right - click menu chose "Properties"

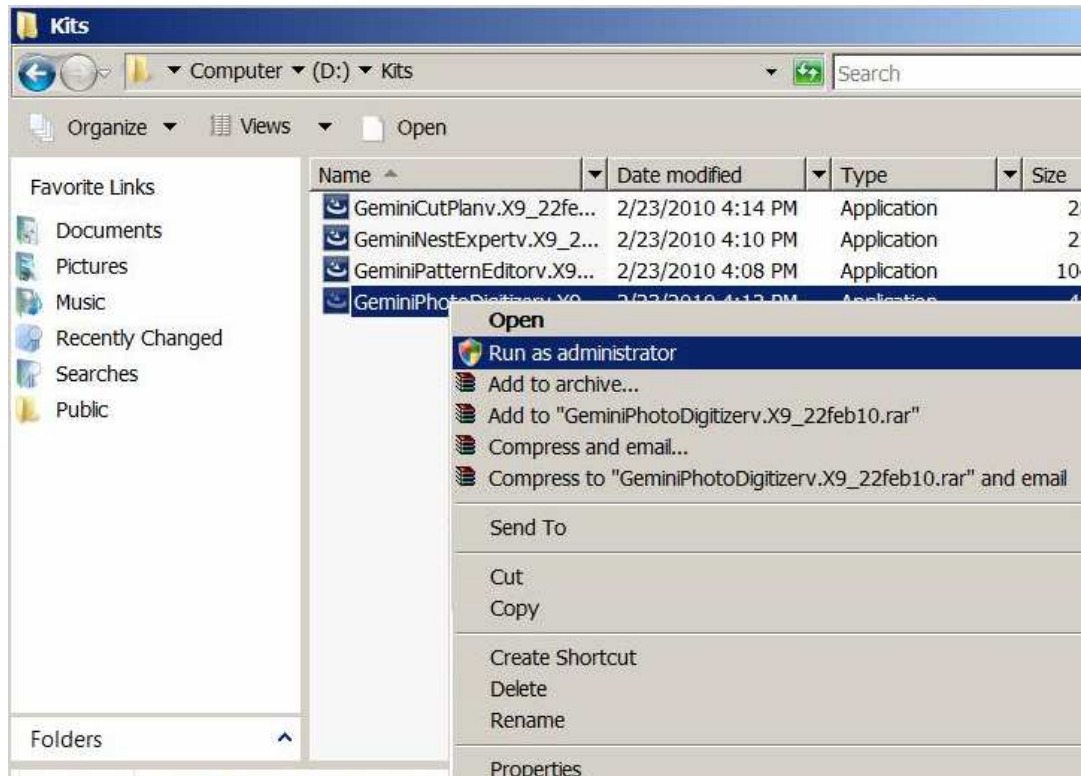


- go to "Compatibility" window, check "Run this program in compatibility mode for:" option and from the drop-down list chose the newest Windows version (in this example "Windows XP")



- press Apply and then OK

** to run the Gemini v.X9 applications with Windows Vista you have to run the installation kit as the administrator of the computer. To run the installation kit as administrator you have to select the installation kit file and from the right-click menu chose "Run as administrator":



*** from the 2 camera types (Cannon and Nikon) only Nikon is compatible with Windows Vista.

**** to run the Gemini v.X9 applications with Windows 7 you have to run the installation kit as the administrator of the computer. To run the installation kit as administrator you have to select the installation kit file and from the right-click menu chose "Run as administrator":

